PB89-225544

Superfund Record of Decision (EPA Region 10) Commencement Bay/Near Shore, WA (First Remedial Action), December 1988

(U.S.) Environmental Protection Agency, Washington, DC

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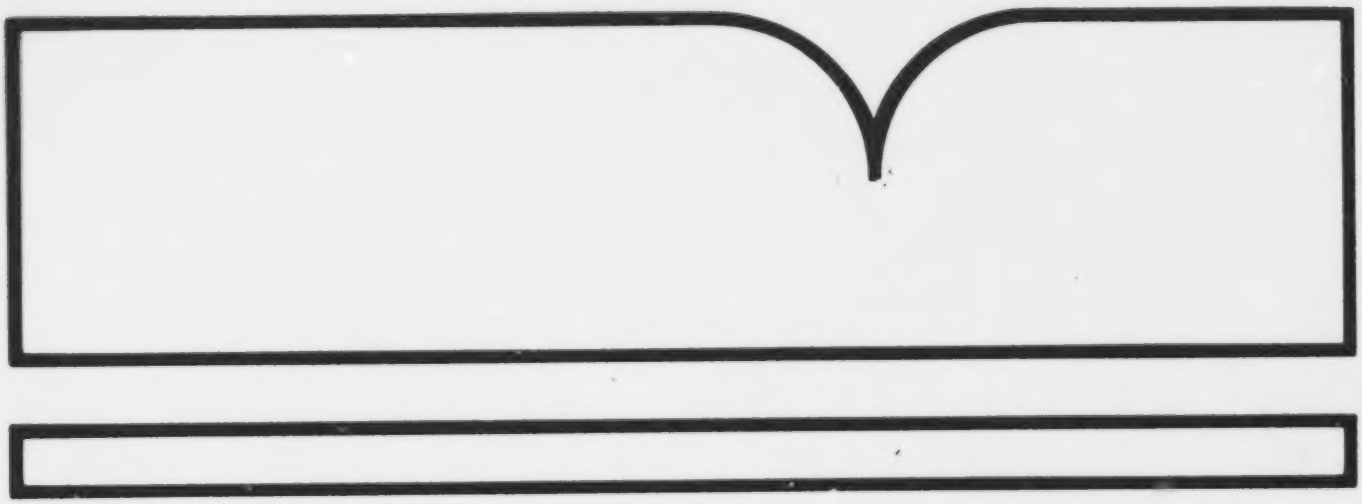

U.S. Department of Commerce
National Technical Information Service
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Office of
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Remedial Response

EPA/ROD/R10-88/011
December 1988

PB89-225544

EPA

Superfund Record of Decision:

Commencement Bay/ Near Shore, WA

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SPRINGFIELD, VA. 22161

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R10-88/011	2.	3. Recipient's Accession No. PB89 225544/AS
4. Title and Subtitle SUPERFUND RECORD OF DECISION Commencement Bay/Nearshore, WA First Remedial Action			5. Report Date 12/30/87 6.
7. Author(s)			8. Performing Organization Rept. No.
9. Performing Organization Name and Address			10. Project/Task/Work Unit No. 11. Contract(C) or Grant(G) No. (C) (G)
12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460			13. Type of Report & Period Covered 800/000 14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The Tacoma Tar Pits site covers approximately 30 acres within the Commencement Bay - Nearsnore/Tideflats site in Tacoma, Pierce County, Washington. The tar pits lie between the Puyallup River, the city, and Wheeler - Osgood Waterways. These bodies of water are not used as a water supply, but support extensive fish and shellfish populations. Currently there is concern for the site's impact on surface water quality and many local industries that use ground water from onsite wells. In 1924, a coal gasification plant began operations, and continued until 1956, at which time they were terminated due to the availability of natural gas. During these years, waste materials from the coal gasification process were disposed of onsite. Contained in the waste materials, were a wide variety of organic compounds and heavy metals. From 1965 to 1966, the plant was dismantled and demolished. Most of the metal structures were removed from the site; however, all demolition debris and below grade structures were left in place, including tanks and pipelines containing tars. In 1967, a metal recycling company began operating at the site. Recycling of automobile batteries introduced acid, heavy metals, lead, and PCBs to the soil. Several studies conducted by EPA and the Washington State Department

(See Attached Sheet)

17. Document Analysis a. Descriptors

Record of Decision
Commencement Bay/Nearshore, WA
First Remedial Action
Contaminated Media: soil, sw
Key Contaminants: VOCs (benzene, PCBs), PAHs, metals (lead)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

Availability Statement	19. Security Class (This Report) None	21. No. of Pages 197
	20. Security Class (This Page) None	22. Price

16. ABSTRACT (continued)

of Ecology between 1981 and 1983 found contaminants derived from the coal gasification process. The primary contaminants of concern affecting surface water and soil include: benzene, PAHs, PCBs, and lead.

The selected remedial action for this site includes: excavation of all contaminated soils exceeding 1 percent total PAHs and all surface soils exceeding a 10^{-6} lifetime cancer risk level with stabilization of all excavated soils in a polymer/cement mixture; capping of the stabilized matrix with asphalt; channeling and managing of surface waters; ground water monitoring; and removal and treatment of ponded water. The estimated present worth cost for this remedial action is $3,400,000.

RECORD OF DECISION

REMEDIAL ALTERNATIVE SELECTION

Site

Commencement Bay - Nearshore/Tideflats, Tacoma Historical Coal Gasification site: Commonly known as Tacoma Tar Pits Site - Tacoma, Pierce County, Washington

Purpose

This decision document presents the selected final remedial action for the site, developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and consistent with (where not precluded by SARA) the National Contingency Plan (NCP, 40 CFR Part 300). The State of Washington has been consulted and has verbally concurred with the selected remedy. Formal concurrence of the state is expected shortly after this decision document is signed.

Basis for Decision

The decision is based upon the administrative record for the site, as obtained from the files of the U.S. Environmental Protection Agency (EPA) and the Washington State Department of Ecology. This record includes, but is not limited to, the following documents:

- Remedial Investigation Report for the Tacoma Tar Pits, Tacoma, Washington (September 1987)
- Feasibility Study of the Tacoma Historical Coal Gasification Site, Final Report (October 1987)
- Risk Assessment of the Tacoma Historical Coal Gasification Site - Final Report (July 1987)

- Decision Summary of Remedial Alternative Selection (attached)
- Responsiveness Summary (attached as Appendix II)
- A complete list of documents contained in the Administrative Record is included as Appendix I
- Staff summaries and documents

Description

This record of decision addresses source control of on-site contamination through excavation of contaminated soils and stabilization of these contaminated soils in a polymer/cement matrix. The stabilized matrix will be capped to reduce surface-water infiltration. Management of migration is addressed by diversion of surface-water runoff. On-site shallow groundwater contains detectable concentrations of contaminants. However, because contamination has not been detected off-site and as the remedial action is expected to prevent further contamination, groundwater extraction and treatment is not considered as appropriate at this time. Should monitoring indicate contamination migration, further treatment may be necessary, to address the shallow groundwater.

The remedial action is designed to:

- Excavate and treat all contaminated soils considered to be Extremely Hazardous Wastes (EHW) defined for this site as exceeding 1 percent total polynuclear aromatic hydrocarbon;
- Excavate and treat (stabilize) all surface soils (<3 feet) containing contaminants that exceed a 10^{-6} lifetime cancer risk level;
- Reduce surface water infiltration and potential human exposure to stabilized soils by capping the stabilized matrix with asphalt;
- Reduce surface water transport of contaminants by channeling and managing surface waters; and
- Provide for continued groundwater monitoring to evaluate the effectiveness of the remedial action and the need for groundwater extraction and treatment;
- Remove and treat bonded water to achieve cleanup goals.

Declaration

Consistent with CERCLA, as amended by SARA, and the NCP, it is determined that the selected remedy as described above is protective of human health and the environment, attains Federal and State requirements which are applicable or relevant and appropriate, and is cost-effective. This remedy satisfies the preference expressed in SARA for treatment that reduces toxicity, mobility, and volume. Finally, it is determined that this remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

12-30-87
Date

Regional Administrator
Environmental Protection Agency
EPA - Region 10

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Treatment will be sufficient to reduce contaminant levels in the soils, and surface waters to or below cleanup standards. Numeric values for these cleanup standards and the criteria used in performance standard development are presented in Table 1. Treatment should be permanent, and should effectively reduce the toxicity and mobility of the contaminants. Performance levels are not to be exceeded during the operational life of the remedial action.

Although Table 1 contains cleanup standards for groundwater the remedial action does not currently provide for groundwater extraction and treatment. Source control measures are expected to reduce contaminant concentrations in the local groundwater system. Ground water monitoring performed during implementation and following the remedial action will aid in determining the effectiveness of the remedial action. If cleanup levels are not achieved at the site boundary in the aquifers within a reasonable period of time following completion of the remedial action, an alternative remedial action will be evaluated and implemented which may include groundwater extraction.

Continued monitoring of surface waters will also be performed to ensure cleanup levels are met during and following implementation of the remedial action. Treated water discharge shall at all times be of quality consistent with U.S. and Washington State laws.

Institutional controls such as deed restrictions to prohibit excavation or drilling will be developed, consistent with the final design, to ensure that the remedial action will continue to protect human health and the environment.

In compliance with SARA the effectiveness and performance of this final remedial action will be reassessed at regular intervals, not to exceed 5 years.

DECISION SUMMARY
REMEDIAL ALTERNATIVE SELECTION
FINAL REMEDIAL ACTION
TACOMA TAR PITS
TACOMA, WASHINGTON

Table 1. Cleanup Goal Performan tandards

Maximum Allowable Contaminant Concentrations

Tacoma Tar Pits Site

Contaminant or Contaminant Class	Soils (mg/kg)	Surface Water, Boundary (ug/l)	Surface Water On-Site (ug/l)	Groundwater (sand and fill aquifers) (ug/l)
Lead	166(2)	3.2(4)	172(7)	50(8)
Benzene	56(3)	53(5)	5,300(7)	53(5)
PCBs	1.0(3)	0.2(4)	2(7)	0.2(4)
PAHs(1)	1.0(3)	5 - 30(6)	219(7)	5 - 30(6)

(1) Included are benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-c,d)pyrene.

(2) Acceptable dose.

(3) 10^{-6} Risk Level.

(4) Chronic freshwater ambient water quality criterion. Performance based on detection limit.

(5) Acute freshwater ambient water quality criterion x 1/100.

(6) Estimated range of chronic freshwater ambient water quality criterion based on marine criteria.

(7) Estimated acute freshwater ambient water quality criterion.

(8) Drinking Water MCL.

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I INTRODUCTION

The Tacoma Tar Pits site is part of the Commencement Bay - Nearshore/Tideflats Superfund site located within the Tacoma Tideflats industrial area near Commencement Bay. A coal gasification plant was in operation on site from 1924 through 1956. A metal recycling facility has been operating on the site from 1967 to the present. Preliminary investigations were conducted at this site between 1981 and 1983 to determine if contaminants were present on site at levels that were a potential threat to human health and the environment.

As a result of the preliminary investigations and the detection of a variety of contaminants in both soils and water, the U.S. Environmental Protection Agency (EPA) identified the need for further investigations performed according to guidelines established by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended in 1986 by the Superfund Amendment and Reauthorization Act (SARA). The purpose of this Decision Summary is to summarize:

- The nature and extent of contamination
- The pathways of contaminant migration
- Rates of contaminant transport
- Risk associated with potential on-site and off-site exposures
- The method for establishing site cleanup standards
- The method of remedial alternative development
- The methodology for evaluation of remedial alternatives
- The results of the detailed evaluation of alternatives
- The preferred remedial alternative
- The enforcement status of the site
- The opinions and acceptance of the preferred alternative by the community.

The Decision Summary is designed to present technical information needed to support the Record of Decision.

Several companies have either previously owned land at the site or currently own or operate on land at the site. Collectively these companies are termed Potentially Responsible Parties (PRP). With guidance and oversight by the EPA and Washington State Department of Ecology (Ecology), several PRPs have undertaken and completed a Remedial Investigation (RI), a Risk Assessment (RA), and a Feasibility Study (FS) for the Tacoma Tar Pits site. EPA and Ecology have found these documents to be acceptable although EPA has prepared an addendum for each document addressing issues that the studies have inadequately or incompletely addressed.

II SITE DESCRIPTION AND LOCATION

The Tacoma Tar Pits site covers an area of approximately 30 acres within the Commencement Bay - Nearshore/Tideflats site, an area of approximately 9 square miles which includes Commencement Bay, seven urban waterways, shoreline areas along the southeast side of Commencement Bay, and the Puyallup River delta. The site lies between the river and the City and Wheeler-Osgood Waterways. As shown in Figure 1, the site is bordered by Portland Avenue and St. Paul Avenue on the north, by East River Road on the east, by East 15th Street on the west, and by Burlington Northern Railroad tracks to the south.

A variety of industries are located on or adjacent to the site. The study area currently contains a metal recycling facility (Joseph Simon and Sons), a natural gas transfer station (Washington Natural Gas), a rail freight loading yard (Union Pacific Railroad), a meat packing plant (Hygrade Food Products), and a railroad switching yard (Burlington Northern Railroad).

The site currently contains two ponds, a small tar pit, and various surface-water drainage ditches. The metal recycling facility contains stockpiles of scrap metal and shredded car interiors. The area is generally flat with local variations in relief of 2 to 5 feet. The present topography has resulted from modifications to the land surface by dredging, filling, and grading activities. Ground elevations generally range from +8 to +12 feet (Mean Sea Level), with higher elevations resulting from stockpiles of shredded car interiors and scrap metal.

The study area is located near several major surface water bodies including the City and Wheeler-Osgood waterways, the Puyallup River, and Commencement Bay. Although none of these water bodies are used for water supply, the bay and river do support extensive fish and shellfish

populations. Several portions of Commencement Bay have been identified as being severely contaminated, resulting in adverse biological effects.

In addition to concerns on the site's impact on surface water quality, contamination of the local groundwater resource is also of concern. Many local industries use groundwater from on-site wells in spite of the fact that potable water from the City of Tacoma is available. Most of these wells are screened at depths of greater than 400 feet. No water supply wells were identified in the uppermost aquifers investigated by the RI and no domestic water supply wells are located in the immediate vicinity of the site.

III SITE HISTORY

A. Site Operations/Disposal History

In 1924 a coal gasification plant was constructed on the site. The plant was also sold in 1924 and continued to operate until 1926 when the property was sold again to Washington Gas and Electric Company. Waste materials from the coal gasification process were disposed of on site. These materials included coal tar liquors, coal ash, and coal tars. These substances by definition contain a wide variety of organic compounds and heavy metals. Many of these organic compounds are toxic and several are considered to be carcinogenic. These compounds include aromatic hydrocarbons (i.e., benzene, toluene), polynuclear aromatic hydrocarbons collectively known as PAH's (i.e., naphthalene, benzo(a)pyrene), as well as numerous other classes of hydrocarbons and cyanide. Heavy metals which are relatively common in such waste streams include arsenic, mercury, and lead.

In 1956, the plant's production of coal gas was terminated due to the availability of natural gas. At this time, Washington Gas and Electric Company merged with Seattle Gas Company to form Washington Natural Gas Company, a distributor of natural gas. Although coal gas production ceased, the plant remained intact until 1965. At that time, dismantling of the plant began. Demolition was completed by 1966. Most metal structures were removed from the site; however, all demolition debris and below grade structures were left in place. Such structures included tanks and pipelines containing tars.

In 1967, a metal recycling company (Joseph Simon and Sons) began operation at the site. A small portion of the property (0.3 acres) was retained by Washington Natural Gas Company. Fill material consisting of scrap

iron, car bodies, soil, and shredded car interiors were used to fill the western and southern portions of the site. This facility recycled a variety of metals largely from automobiles and transformers. Automobiles were disassembled and materials sorted and processed. The recycling of automobile batteries introduced both acid and the heavy metal lead to the soil. Prior to scrapping, transformers were drained of their oil. During the time period in question, these oils typically contained polychlorinated biphenyls (PCBs).

The Hygrade property originally was owned and operated by Carstens Packing. Little has been changed since the original construction of the Carstens Packing complex in the early 1900's. Hygrade purchased the plant and property from Carstens Packing in 1979. In about 1965, the eastern half of the Union Pacific Railroad property was filled, a freight house constructed, and the surrounding area paved.

The area east of East River Street remained undeveloped until after 1970. The area has been filled and leveled for possible warehouse construction.

B. Regulatory History - Previous Investigations

In 1981, EPA analyzed aerial photographs of the site as part of their evaluation of the Commencement Bay tidal flats area and found evidence of a pond that potentially contained waste materials. In 1981, the Washington State Department of Ecology (Ecology) conducted an inspection of the Joseph Simon and Sons property, noting runoff contained a considerable amount of oily material. A tar sample was collected from the tar pit and was found to contain 4 percent PAHs and 240 ug/l phenol.

In 1982, the EPA Field Investigation Team (FIT) conducted a perimeter inspection of the site, and the results were used together with historical information to complete a EPA Potential Hazardous Waste Site Preliminary Assessment. This assessment concluded a potential hazard to the environment existed due to the presence of oils, grease, phenols, PAHs, heavy metals, and unknown chemicals.

Following the FIT investigation, the EPA requested that the property owners conduct a preliminary investigation to assess the severity of contamination. This study consisted of a data review, a hydrogeologic investigation, and the collection and analysis of soils, surface waters, groundwaters, and tars. The report from this study was issued in May 1983. In addition to contaminants derived from the coal gasification process, lead and PCBs were detected.

In September 1983, another site inspection was performed by EPA and Ecology and in the same year, the EPA issued a final report entitled, "Tacoma Tar Pit Scope of Work," which contained investigative work elements necessary to complete a RI. In 1984, the EPA prepared a Final Work Plan and in September 1984, initiated RI activities. Shortly after the EPA investigation was initiated, agreement was reached with several PRPs and a Consent Order was signed allowing these PRPs to conduct the RI/FS. The PRP investigations commenced in November 1984.

C. The Remedial Investigation

The purpose of the RI was to determine the types of waste materials that were present on site, the composition of these wastes, the extent to which waste materials were distributed over the site, and the extent of migration of toxic compounds from the waste materials. In addition to defining the nature

and extent of contamination, the RI was designed to characterize site geology and hydrology to evaluate mechanisms and rates by which toxic compounds may be transported from the site to potential receptors. The RI also examined the potential for airborne transport of site contaminants. The RI was performed in several phases with intermediate reports reviewed by EPA and Ecology. The final RI document was submitted to the EPA in September 1987. EPA and Ecology have prepared an addendum to this report to identify and discuss issues that were not fully addressed or investigated by the RI.

1. Site Contaminants

Based on the results of previous investigations, a variety of waste materials were anticipated to be present on-site. These materials included:

- Organic compounds derived from coal tar including PAHs, volatile organics, aliphatic hydrocarbons, cyanide, sulfite, phenols, and heterocyclic compounds of sulfur, oxygen, and nitrogen.
- Ash from coal carbonization
- Coal residue
- Shredded car interiors containing metal, oil, grease, plastics, and synthetics fibers
- Animal fat or animal byproducts
- Heavy metals
- PCBs
- Pesticides, herbicides, and rodenticides.

To maximize the efficiency of the RI, the investigation was divided into ten subtasks comprised of:

- Project management
- Research of available records
- Site features investigation
- Hazardous waste investigation
- Hydrogeologic investigation

- Surface-water investigation
- Air quality investigation
- Biota investigation
- Bench and pilot tests
- Public health and environmental concerns

No bench or pilot studies have been performed to date, these being left until the Remedial Design is commenced, and the final task was redirected to evaluate contaminant transport pathways. With these exceptions, the RI was executed in its entirety.

2. Soil

The RI included the drilling of 32 soil borings, excavation of 13 backhoe pits, and analysis of soil samples for a variety of toxic contaminants. Organic compounds and other tar-related contaminants were found in soils at locations known to contain coal gasification wastes. In most locations where organic contaminants were detected, there existed physical evidence (i.e., staining, odor) of tar materials.

Coal Gasification Wastes

Coal tar and other coal gasification wastes are known to be present in three site locations: the tar pit, the North and South Ponds, and in an area of tar boils. Coal tar most likely occurs in a thin layer within these historic waste emplacements. Coal tar in the ponds is 1 to 3 feet thick and is approximately 2 feet thick beneath the tar pit. The total estimated volume of tar is 5000 yd^3.

Tar and soil contaminated with tar are widely distributed over the site as a result of coal gasification plant operations. Figure 2 shows the principal areas of waste discharge. These areas include:

- The plant property - possible spills and waste
- Areas receiving overland flow
- Areas where wastes and wastewaters were ponded
- Areas receiving runoff from ponds.

Surface areas of tar contamination are confined to the three areas listed above. The vertical extent of a relatively "pure" tar is estimated to be on the order of several feet. However, during the soil investigation, evidence of tar contamination was observed at greater depths. The vertical migration of tar appears to have been affected by gravitational pull as black oily layers were observed just above silty layers. The deepest penetration of tar was observed at a location adjacent to the ponds where a slight tar odor was detected at a depth of 50 feet. Figure 3 shows cross sections of the site with the location of this soil boring (18). The location of the cross sections can be found on Figure 1.

The presence of tar at depth is in part a function of the underlying stratigraphy. In locations where less permeable confining zones (aquitards) are present, evidence of tar at depth is not found. At the borehole 18 location, this upper aquitard appears to be very thin or absent. A lower aquitard between the sand aquifer and the lower aquifer also appears absent at this location.

PCBs

PCBs are widely distributed in the fill material across the site, with concentrations in surface soil ranging from the method detection limit to 204 mg/kg. PCBs appear to be confined to the fill material overlying the upper aquitard. Figure 4 shows the areal extent of PCB contamination as defined by the RI.

Metals

Metals concentrations are generally elevated in the fill material with significantly lower concentrations at depths of 8 to 10 feet, coinciding with the top of the upper aquitard. Highest concentrations are present in areas where shredded car interiors are stockpiled. Lead was the most widely distributed heavy metal, with concentrations highest in the northern portion of the site (greater than 10,000 mg/kg). Tars generally contained less than 200 mg/kg of lead, while most surface soils contained concentrations of 2000 to 8000 mg/kg. Figure 5 shows the extent of lead contamination in surface soil.

3. Surface Water

Surface runoff patterns at the site are complicated by the variety of surface materials (i.e., asphalt, car interiors, scrap metal) and the lack of topographic relief. Surface waters in the eastern portion of the site flow primarily to the BNRR ditch on the south side of the property, and then are diverted northeast towards the Puyallup River. Surface water in the western portion of the site flows westward toward the North and South ponds.

Monitoring of surface water flow was performed at 15 surface water monitoring stations. Surface water quality was determined on several occasions at five of these stations. Heavy metals, cyanide, and organic contaminants were detected in surface waters on-site.

Surface water quality is characterized by near-neutral pH (6.5 to 7.2) with conductivities ranging from 270 to 525 umhos/cm. Trace concentrations of barium, iron, manganese, and zinc were detected in most surface water samples. Aluminum, arsenic, cadmium, chromium, copper, lead, mercury, and nickel were intermittently detected in low concentrations. Cyanide was detected at one sampling station.

Analytical data indicates a variety of organic compounds are present in surface waters. These compounds include aromatics compounds (benzene, toluene, xylene), PAHs (naphthalene, pyrene, acenapthene), nitrophenols, and PCBs.

4. Groundwater

The local groundwater system was investigated by construction of soil borings, installation of 23 groundwater monitoring wells, the sampling of these 23 wells, and sampling of 6 wells installed during a prior investigation. Information on subsurface conditions obtained by the soil investigation program was also used to define local geologic conditions. The results of the groundwater investigation showed that three shallow water-bearing strata (aquifers) exist at depths of less than 60 feet. In order of increasing depth, these aquifers are referred to as the fill, sand, and lower aquifers respectively. In some locations these three "aquifers" are separated by finer clay minerals. In these locations, flow between these aquifers would be reduced. However, in some locations this "confining" layer is absent and waters from one aquifer are in direct contact with waters from a deeper aquifer (see Figure 3), allowing waters from these two aquifers to mix.

The presence of groundwater monitoring devices in three subsurface zones allowed estimations of directions of groundwater flow. Results indicate that in the shallowest zones (fill and sand aquifers) tides strongly affect the direction of groundwater flow and, therefore, water movement. However, the system is extremely complex, and therefore, only estimates of the quantity and rates of water movement are possible. As there are only a limited number of groundwater wells investigated in the deepest aquifer, the direction of groundwater flow cannot be accurately estimated.

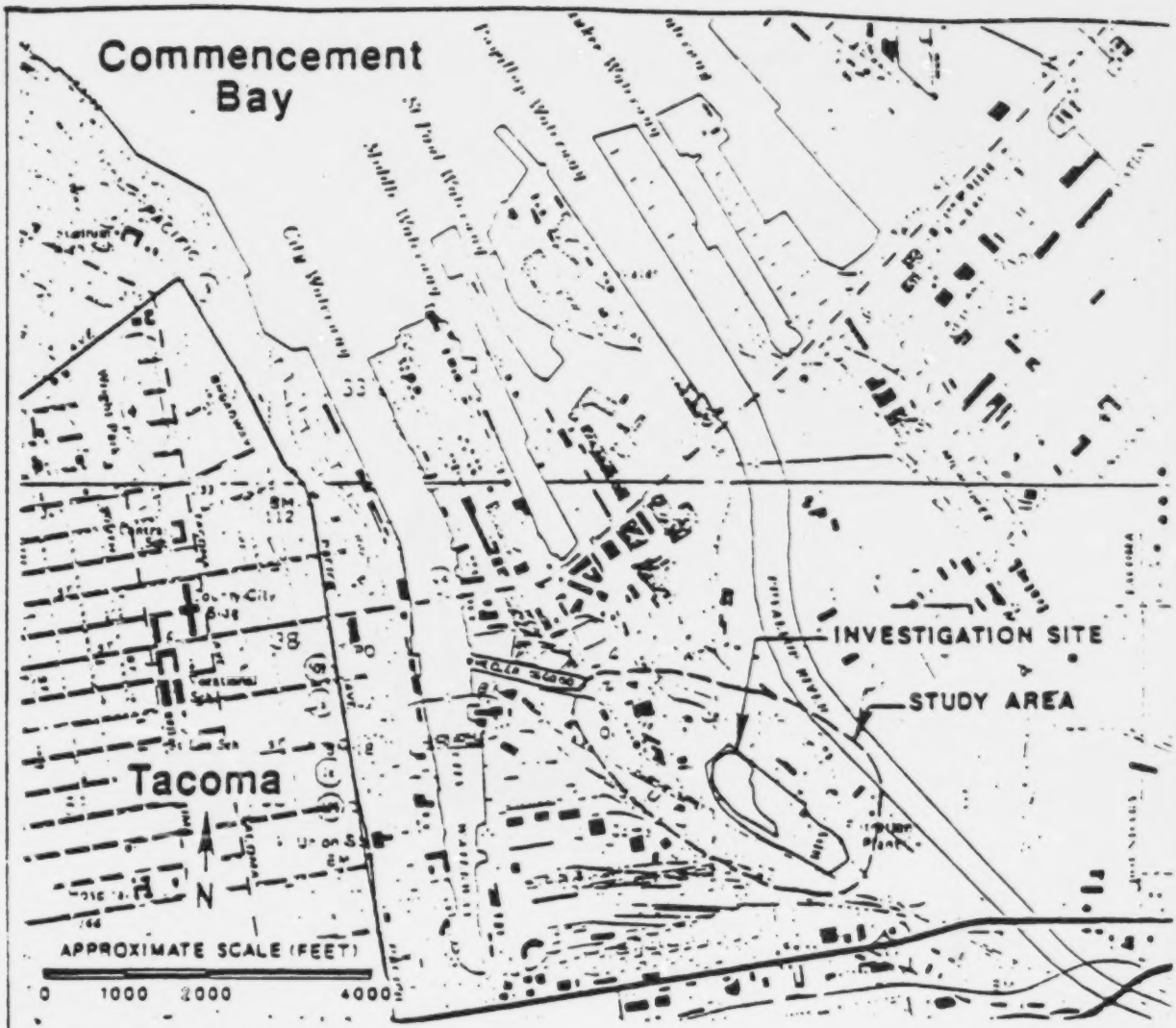
Fill Aquifer Water Quality

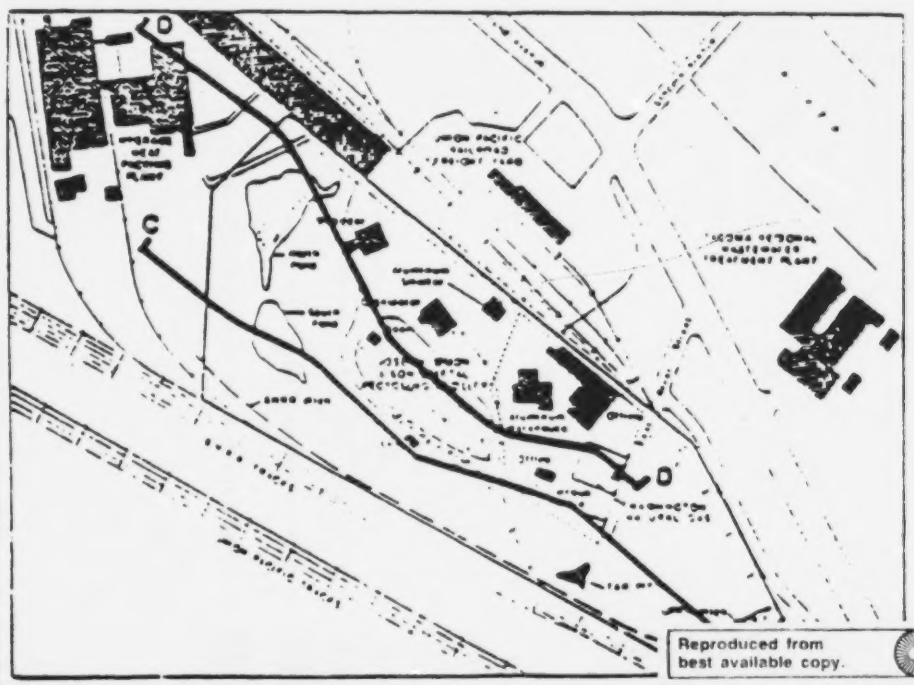
Water quality in this aquifer is characterized by near-neutral pH (6.1 to 7.2) with conductivity ranging from 300 to 860 umhos/cm. These conductivities suggest levels of total dissolved solids of about 500 mg/l. Trace concentrations of aluminum, barium, iron, manganese, and zinc were detected in most fill aquifer samples. Mercury, arsenic, and lead were detected in groundwaters from some wells.

A variety of organic compounds were detected in groundwaters of the fill aquifers. These include benzenes, phenols, and PAHs. For most wells, total PAH and benzene concentrations range from 5 to 30 ug/l, although samples from some wells indicate waters containing significantly higher concentrations. Figure 6 shows the areal distribution of total PAH compounds in the fill aquifer for four rounds of groundwater samoling.

Sand Aquifer Water Quality

Groundwater in the sand aquifer is characterized by pH values ranging from 6.0 to 7.0, with conductivities (720 to 7250 umhos/cm) higher than the overlying fill aquifer. Concentrations of trace metals in this aquifer are similar to those observed in the fill aquifer. Cyanide was detected in the one well, and organic compounds were detected in 9 of 14 wells sampled.





Site Location M.
Tacoma Tar Pits
Tacoma, Washin

Figure 1

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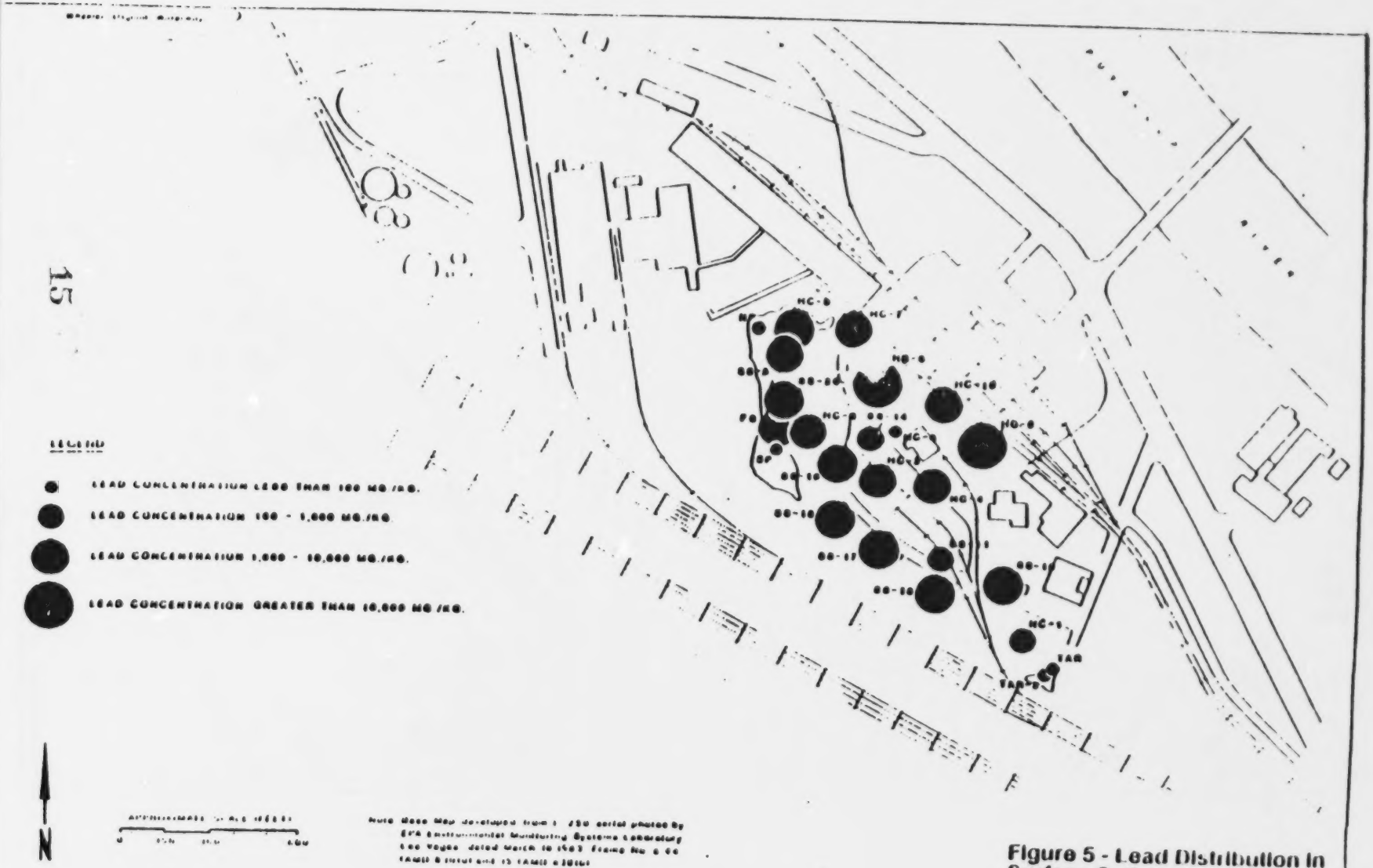
LEGEND
LEAD CONCENTRATION LESS THAN 100 MG/KG.
LEAD CONCENTRATION 100 - 1,000 MG/KG.
LEAD CONCENTRATION 1,000 - 10,000 MG/KG.
LEAD CONCENTRATION GREATER THAN 10,000 MG/KG.
N

Figure 5 - Lead Distribution in Surface Soils and Tars

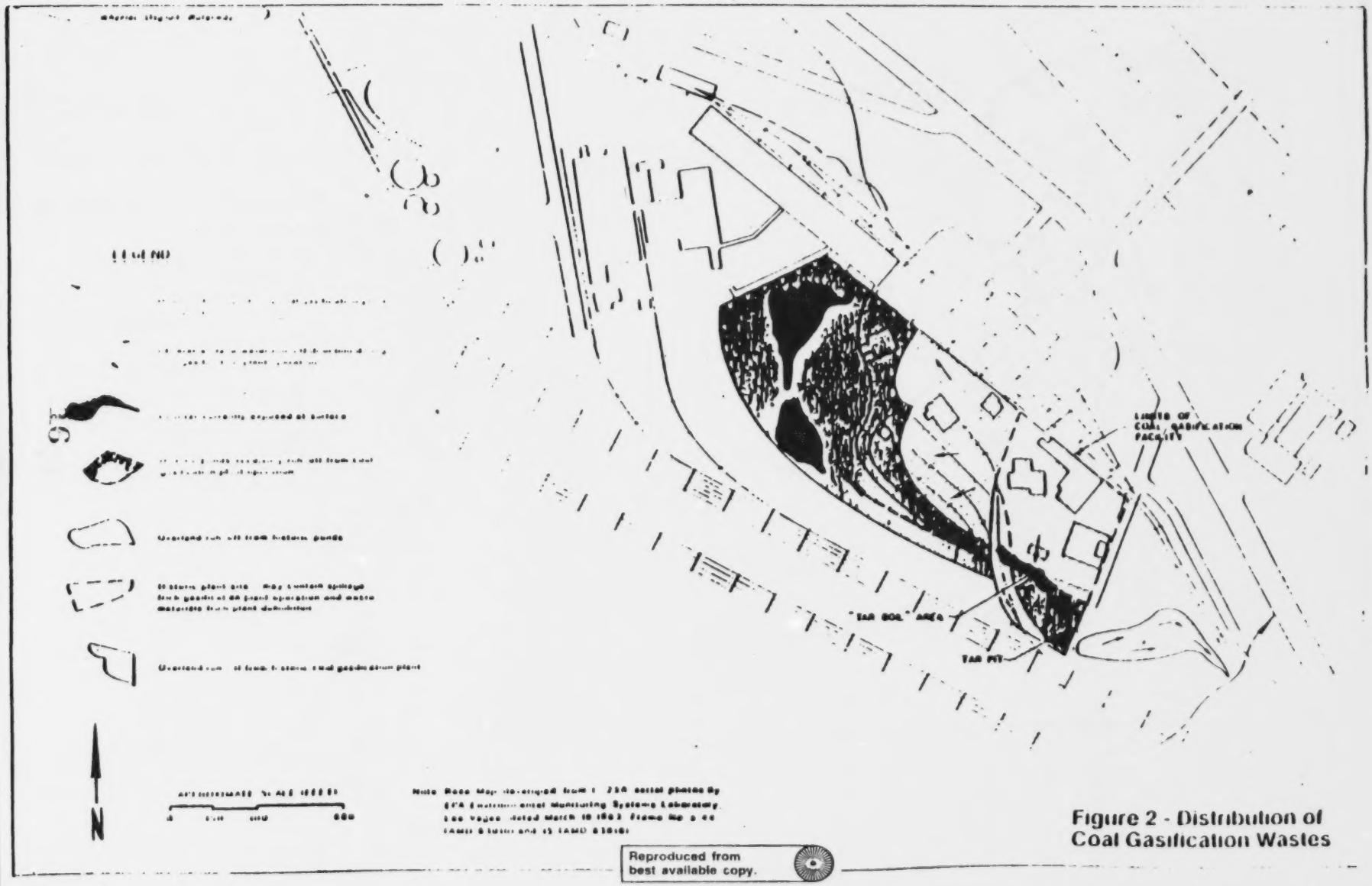

Figure 2 - Distribution of Coal Gasification Wastes

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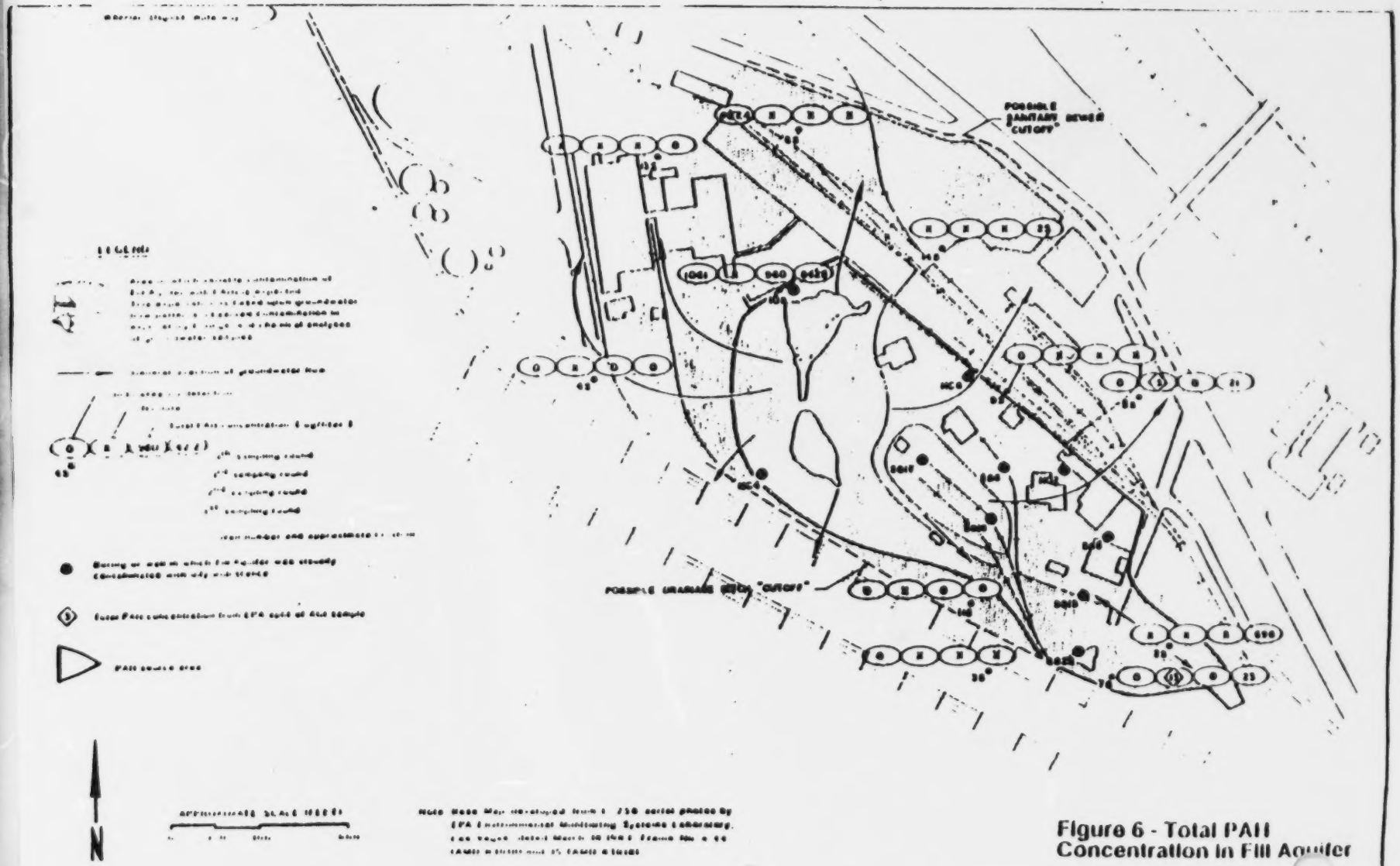

Figure 6 - Total PAH Concentration in Fill Aquifer

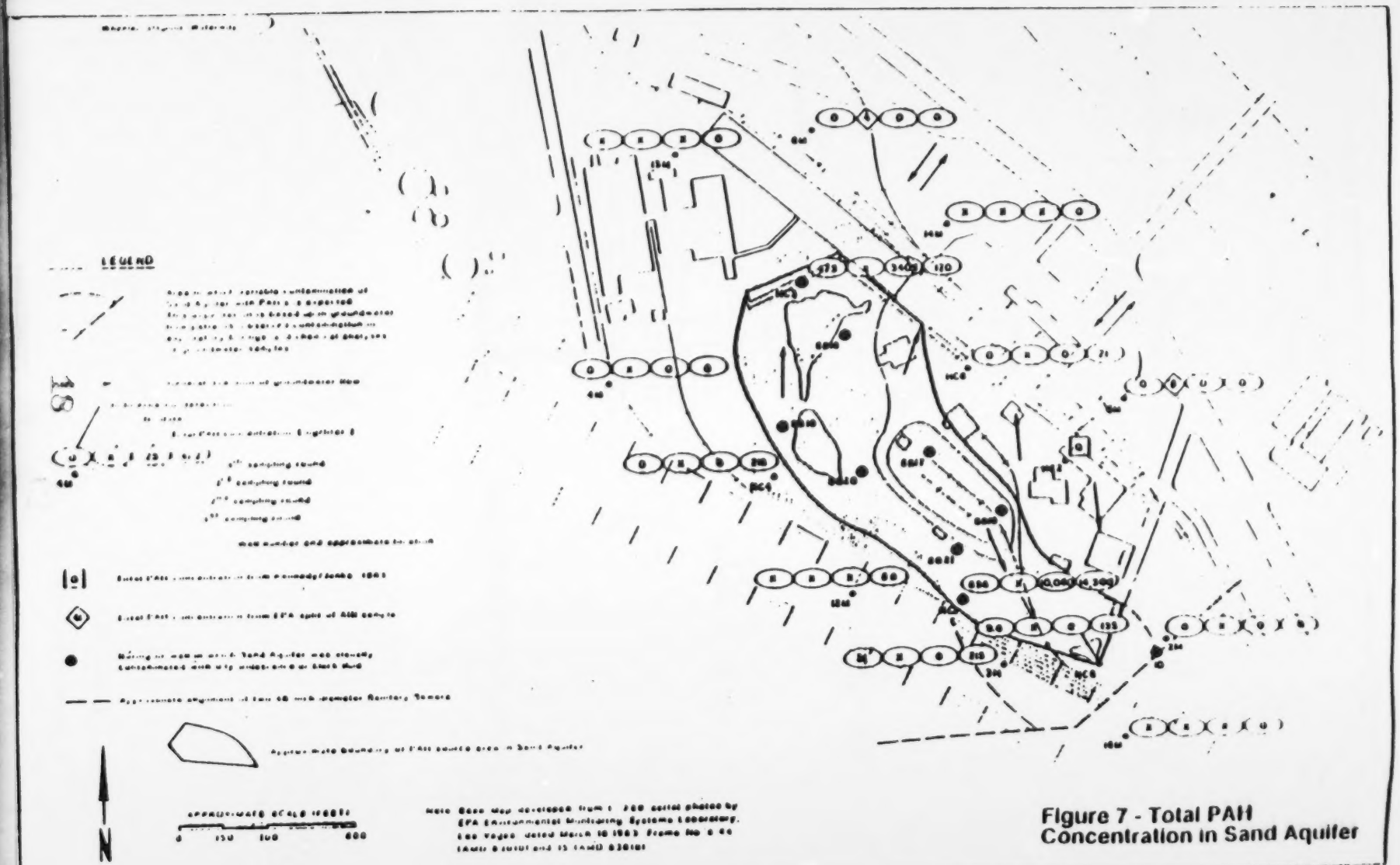

Figure 7 - Total PAH Concentration in Sand Aquifer

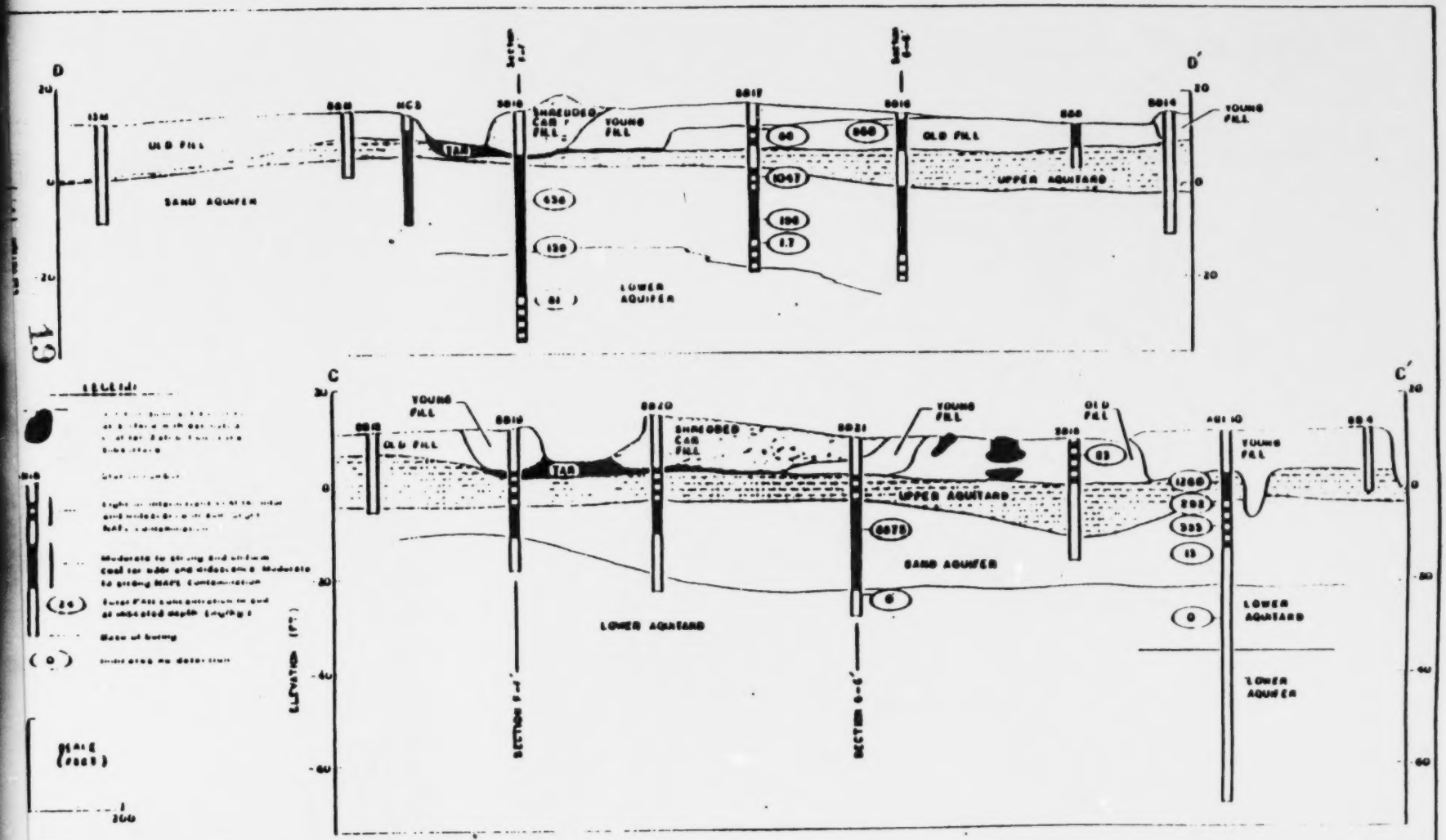

Figure 3 - Subsurface Lithology and Tar Occurence

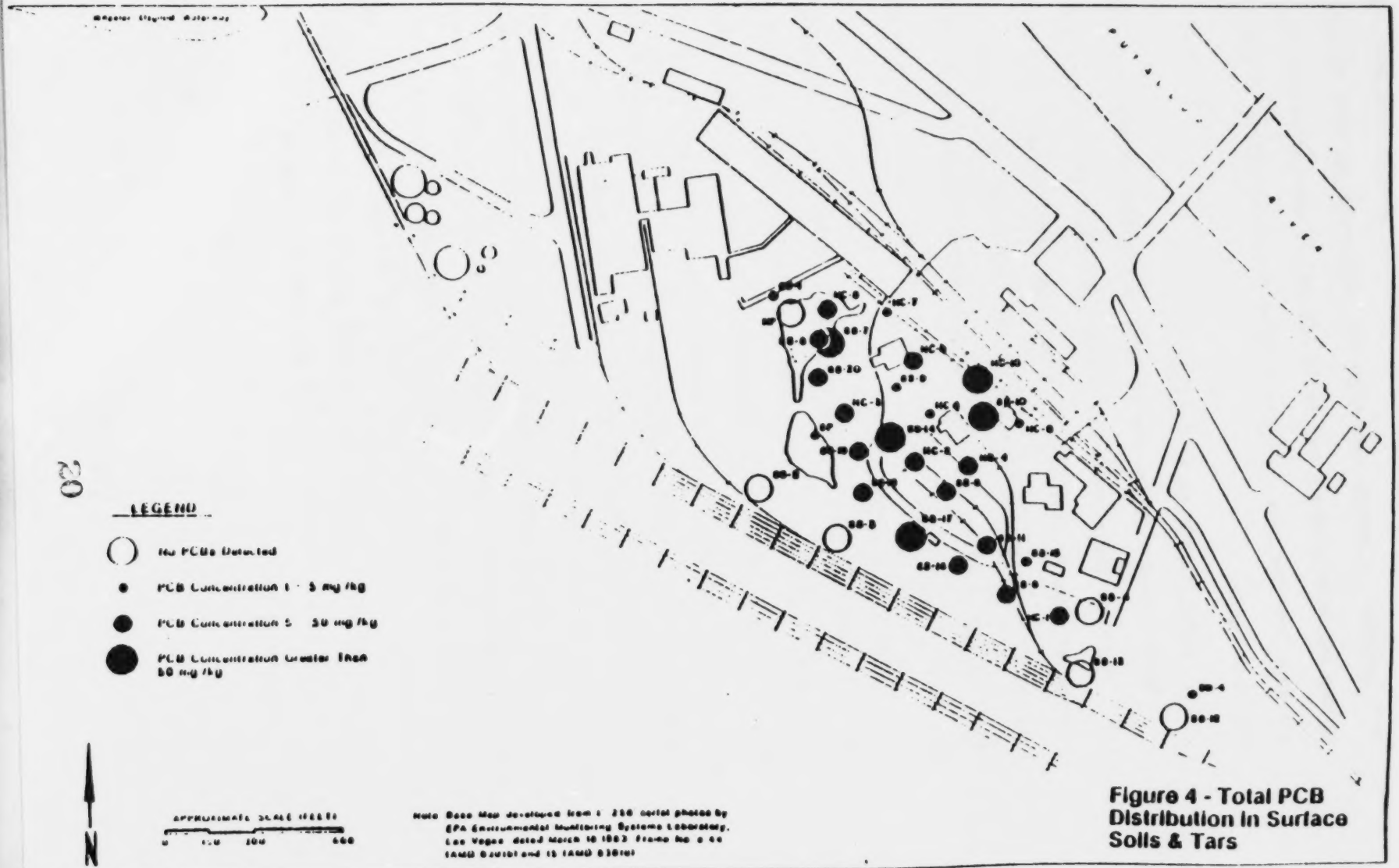

Figure 4 - Total PCB Distribution in Surface Soils & Tars

Organic compounds detected include benzenes, phenols, and PAHs, similar to the fill aquifer. Although very high PAH concentrations were detected in wells within the site boundary (up to 14,000 ug/l), concentrations decrease with distance from the site. Figure 7 shows the distribution of PAH compounds in the sand aquifer.

Lower Aquifer Water Quality

Three groundwater monitoring wells are placed in the third aquifer at the site. Although these zones may not be continuous and the direction of groundwater flow in this zone is poorly defined, the wells are placed such that there is a reasonable degree of certianty that "worst-case" downgradient water quality is being measured. Water quality results suggest that water in this zone does not contain significant concentrations of contaminants.

5. Migration Pathways

Coal gasification wastes were placed into or onto soils. Contaminants resulting from other site operations were also introduced directly to the soil. Therefore, exposure to contamination by humans or the environment will occur via a migration pathway relating to the on-site soil contamination. Contaminants in soil may be transported directly to a receptor by ingestion, direct exposure, or inhalation of soil particles suspended in air. Contaminants volatilized from soils may also be inhaled by on-site workers or others. Soil contaminants may be solubilized and transported via surface waters or groundwaters. Human receptors may be exposed to contaminants by direct contact with waters or ingestion. Biota may be exposed to site contaminants by vegetation uptake, ingestion of aquatic organisms, ingestion of soil, ingestion of contaminated surface waters, or direct contact. The pathways considered to be of priority are transport from soil to air, surface water, and groundwater.

6. Contaminant Migration

Air

Contaminants of concern at the site could potentially be transported from the site by wind. Therefore, the RI considered the potential for movement of small particles by this mechanism. There are two methods to estimate wind dispersion. The concentrations in the air can be measured directly or the quantity of particulates can be estimated using established mathematical methods. The RI team utilized the latter of these approaches. Results suggest that PCBs and lead are the pollutants of greatest concern. Results also indicate that on-site workers would be the only humans at risk from exposure to these contaminants. The site poses no risk to the surrounding community by wind blown dispersion of contaminants.

Surface Water

Surface-water flow rates and contaminant concentrations were used to calculate fluxes of contaminants leaving the site via the surface-water pathway. A single surface-water monitoring station was selected and fluxes calculated for compounds that had been detected at that location. Fluxes are available for selected metals, benzenes, and PAHs.

Ground Water

The estimation of rates of transport for contaminants via the groundwater system is limited by the current lack of understanding of local groundwater hydrology. Due to the complicated nature of the system, values have a low degree of confidence and should be used with caution. Fluxes for metals, benzene, phenols, and PAHs were calculated for fill and sand aquifers. Contaminant fluxes are generally low.

D. The Risk Assessment

The purpose of the risk assessment was to determine the magnitude and probability of potential harm to humans and the environment and to determine site performance standards (cleanup levels). The RA evaluations were based on the results of the RI and methodology currently in use by the EPA. These methods establish guidance for the estimation of levels to which hazardous waste sites should be remediated.

The RA evaluations consisted of four study elements: exposure, toxicity, risk characterization, and selection of "How Clean is Clean" levels or site performance standards. The methodology used in the RA under the above study elements includes the identification of exposed populations and exposure pathways, the selection of indicator contaminants for carcinogens and threshold-acting chemical constituents, computation of acceptable doses for these target chemicals, and the quantification of risks.

The major contaminants at the site are coal tar pitch residuals, PCBs, and trace metals. From data generated by the RI, three organic constituents and one trace metal were selected as indicator chemicals representing the overall level of site contamination. These indicator contaminants were selected based on their toxicity, concentrations in site waters and soils, and tendency to be transported from the site. The selected indicator compounds are benzo(a)pyrene, PCBs, benzene, and lead. The RA evaluations were performed for these indicator chemicals and the exposure pathways appropriate to the target population. Soil ingestion, inhalation of airborne particulates and vapors, and dermal contact were all considered pathways for exposure.

The target receptors (exposed population) considered for the RA were the on-site workers. Since the site is within a heavily industrialized area, wildlife or fish populations were not considered as target receptors except

for the avian population which occasionally uses the pond areas on the site.

The "How Clean is Clean" levels defined as maximum allowable concentrations (MASC) for on-site soils were determined from simple models which quantify the transport of contaminants from the source (on-site soils) to the receptor (on-site workers). In addition to transport factors, the models account for the contaminant intake rate which will not induce an adverse affect to target receptors. This latter parameter, defined as the Acceptable Dose (AD), was estimated from EPA-approved hazard assessment data for carcinogens and threshold acting chemicals.

MASCs were calculated from these predictive models and the uncertainty associated with these values was quantified using probabilistic sampling techniques. The MASC values for the target contaminants were then reported as the concentration of the contaminant in soil associated with a specific probability of exceeding the acceptable level for that constituent.

For lead, the MASC was computed for two AD values corresponding to the promulgated maximum contaminant level (MCL) and the recommended maximum contaminant level (RMCL). The ADs for lead were derived from drinking water standards. For the carcinogens (benzene, benzopyrene, PCB), the MASCs were reported for two risk levels, 10^{-4} and 10^{-6}, and for two exposure periods (lifetime and short term). The lifetime exposure period assumes that a site worker would be in contact with site soils for a 70-year period. The short-term exposure period assumes continuous contact with deeper soils or tars for a 1-month period during construction or excavation activities.

The MASC values computed for the individual and cumulative pathways are summarized in tabular form in Table 1. Included in the table are the comparable MASC values associated with a 10 percent probability of exceeding

Table 1. Pathway Specific MASC Values

Chemical	Exposure Period	Risk Level	Ingestion MASC (mg/kg)	Dermal MASC (mg/kg)	Inhalation MASC (mg/kg)	Cumulative MASC (mg/kg)
Lead	Daily	0; AD from MCL	91	98	2,500	57
Lead	Daily	0; AD from RMCL	226	242	6,250	139
BAP	Lifetime	10^{-4}	16	2.4	2,673	2.2
		10^{-6}	0.2	0.02	26.7	0.02
	Short Term	10^{-4}	1132	93	158,800	87
		10^{-6}	11.3	0.93	1,588	0.9
PCB	Lifetime	10^{-4}	3.6	0.7	947	0.6
		10^{-6}	0.04	0.01	9.5	0.01
	Short Term	10^{-4}	3,013	588	782,353	524
		10^{-6}	30.1	5.9	7,824	5.2
Benzene	Short Term	10^{-4}	444,000	1,637,000	5,654	5,613
		10^{-6}	4,440	16,370	56.5	56

Table 2. Cleanup Goal Performance Standards
Maximum Allowable Contaminant Concentrations
Tacoma Tar Pits Site

Contaminant or Contaminant Class	Soils (mg/kg)	Surface Water, Boundary (ug/l)	Surface Water On-Site (ug/l)	Groundwater (sand and fill aquifers) (ug/l)
Lead	166(2)	3.2(4)	172(7)	50(8)
Benzene	56(3)	53(5)	5,300(7)	53(5)
PCBs	1.0(3)	0.2(4)	2(7)	0.2(4)
PAHs(1)	1.0(3)	5 - 30(6)	219(7)	5 - 30(6)

(1) Included are benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-c,d)pyrene.

(2) Acceptable dose.

(3) 10^{-6} Risk Level.

(4) Chronic freshwater ambient water quality criterion. Performance based on detection limit.

(5) Acute freshwater ambient water quality criterion x 1/100.

(6) Estimated range of chronic freshwater ambient water quality criterion based on marine criteria.

(7) Estimated acute freshwater ambient water quality criterion.

(8) Drinking Water MCL.

the acceptable dose for each target chemical and each pathway, and the cumulative exposure rates. This risk level has been selected as a recommended level of protection. As shown, dermal contact is the critical exposure route for the organic contaminants. Inhalation is not a significant pathway at the maximum total suspended particulate matter concentrations predicted for the site.

The RA presented these values with recommended cleanup goals. In a series of meetings between the EPA and Ecology, it was agreed that remedial objectives associated with both the 10^{-6} and 10^{-4} risk levels would be evaluated during the FS. The mutually agreed upon cleanup standards are summarized in Table 2.

IV ENFORCEMENT

A RI and FS was conducted by Joseph Simon & Sons, Inc., Washington Natural Gas Company, Hygrade Food Corporation, and Burlington Northern Railroad Company pursuant to an "administrative order on consent" entered into and issued by EPA on November 1, 1984. EPA is now prepared to implement the settlement procedures set forth in Section 122 of CERCLA, 42 U.S.C. §9622, and offer these same parties the opportunity to perform the selected remedial action pursuant to a consent decree. EPA intends to commence a negotiation period with the PRPs shortly after the signing of the ROD. The Department of Interior and the State of Washington have been invited to participate in the negotiations. If for any reason, agreement cannot be reached with these parties, EPA will initiate alternative action to insure that the remedial action proceeds. Finally, EPA is still considering the possibility of identifying additional parties who may be potentially responsible for conditions at the site.

V COMMUNITY RELATIONS

Community interest for the Tacoma Tar Pits Superfund site has not been actively demonstrated to either EPA or Ecology. It must be considered that this site is actually a small unit within the larger Superfund site, Commencement Bay - Nearshore/Tideflats and that the Tacoma Tar Pits is located within a heavy industrialized area with no private residences nearby. In fact, the community relations plan for the Tacoma Tar Pits is contained within the plan for Commencement Bay and South Tacoma Channel Superfund sites. Under a cooperative agreement with EPA in 1983, Ecology was delegated as the lead agency in conducting investigations for the Nearshore/Tideflats, Ruston/Vashon Island, and Tacoma Municipal landfill sites. EPA retained its role as the lead agency for the Tacoma Tar Pits, ASARCO Tacoma Smelter, South Tacoma Swamp, and Well 12A sites. The Tacoma-Pierce County Health Department, (Health Department) through another Interagency Agreement with Ecology, conducts community relations support activities for the Nearshore/Tideflats and Ruston/Vashon Island sites.

The Commencement Bay and South Tacoma Channel Superfund sites are located within the City of Tacoma, on the south central portion of Puget Sound, Pierce County, Washington. Tacoma is one of the oldest cities in the Pacific Northwest, dating back to 1841. The population of Tacoma, the second largest city in Washington nest to Seattle, is 158,501 (U.S. Department of Commerce, 1980), and 485,667 people live in Pierce County.

Manufacturing, wholesale and retail trade, and services are the primary industries in the Tacoma area (Washington State Employment Security, 1985) with a large portion of the labor force employed in the manufacturing sector. Surrounding areas are characterized with densely populated forests which supply the lumber necessary to local industry. Manufactured goods are primarily wood and paper products, and chemicals. The Port of Tacoma is the state's largest export port, and auto import port. It is the fourth largest auto importer on the West Coast. During the years 1980 to 1986 the county's population has grown 9.3 percent, and non-agricultural employment increased by 15.2 percent (Washington State Employment Security, 1987). Clearly, Tacoma's economy has been growing steadily in recent years.

Both present and historical industrial activities have released hazardous chemicals and other production by-products into Commencement Bay, the South Tacoma area aquifers, and the surrounding environment. These products incl[illegible] metals (arsenic, lead, zinc, copper, cadmium, hydrocarbons (PAHs), chlorinated butadienes, and pesticides. Hazardous substances have been found in sediments in the waterways, cadmium and arsenic have been documented is soils near the Ruston area, PAHs and PCBs have contaminated groundwater aquifers in the South Tacoma area, and fish and shellfish in Commencement Bay have been found with elevated levels of organics and other clorinated compounds in their tissues.

Chemical contamination of Commencement Bay and the South Tacoma Channel area prompted the site's nomination to the National Priorities List (NPL) in October, 1981. In April, 1983 the EPA announced an agreement with Ecology to conduct a RI/FS for the Commencement Bay Superfund site. The RI, which was completed in 1985, characterized the nature and extent of contamination in the

Nearshore/Tideflats area. The FS, which evaluates and alternatives of cleanup action for this area of the Tacoma Superfund Sites is now underway. RIs for the Tacoma Municipal landfill, South Tacoma Swamp, Tacoma Tar Pits, and South Tacoma Channel, and FSs for the South Tacoma and Tacoma Tar Pits have been completed. An on-site RI for the ASARCO Tacoma Smelter began in Septemb. 1987. These investigations are being conducted by private consulting firms.

Community Involvement

Tacoma area residents became acutely involved in Commencement Bay and South Tacoma Channel environmental issues prior to their nomination to the NPL in October 1981. Over one hundred people attended an April 1981 public meeting at which several federal, state, and local governmental agencies met to explain the area's contamination and hazardous waste problems, and describe what would be done about the situation. Concern about these problems was moderate, with groups such as the Audubon Society and Washington Environmental Council the most active. Most people's comments at that time centered around the perception that not enough was being done to correct the problems. at that time, Commencement Bay and the South Tacoma Channel were given considerable press and media attention.

In the years following Commencement Bay and South Tacoma Channel's nomination to the NPL, the level of citizen concern appears to be less than it was in 1981. EPA, Ecology, and other agencies have conducted several investigations, sampling-analysis surveys, and cleanup activities at many of

the individual areas within the Commencement Bay and South Tacoma Superfund sites. These investigations have served as demonstrations that Tacoma's hazardous waste problems are not being ignored, and have provided a better understanding of the nature of the problem and its risk to human health and the environment.

The Health Department by Interagency Agreement with Ecology has been the lead agency for implementing a Superfund Community Relations Plan was completed for the Commencement Bay site. In response to input at a public meeting held in 1983, the Health Department developed a Citizen Advisory Committee (CAC) to help implement the Community Relations Program during investigations and remedial action at these Superfund sites.

Community Relations activities conducted by the Health Department have included: Coordinating and holding public meetings for informational purposes and at various stages of the specific site investigations and cleanup, briefing local governmental officials on the status of area Superfund investigations, hazardous waste presentations to grade school children, presentations to environmental groups and interested parties upon request, and tours of Commencement Bay. Additional activities have included the production and distribution of pamphlets and fliers (including translation for Asian communities) to Tacoma and Pierce County communities, and preparing project updates, fact sheets, and press releases.

Specific Activities: Tacoma Tar Pits

On three separate occasions over the past two years EPA has met with the CAC to update the group as to the progress with the investigations and to indicate EPA's future plans. The CAC as well as a larger group of interested citizens and special interest groups have been recipients of news letters and project updates. The most recent mailing was issued the first week in November 1987. Approximately 200 copies of the Proposed Plan and Project update (Fact Sheet) for Tacoma Tar Pits were sent out using the Commencement Bay mailing list. On November 18, 1987, EPA held a public meeting at the Pierce County Health Department to accept comments on the preferred alternative for remedial cleanup at the Tacoma Tar Pits site. Despite wide coverage by newspaper, radio, and a local television station, only two private citizens came forward to comment on the proposed plan. These comments are addressed in the Responsiveness Summary. Copies of the Administrative Record have been maintained at the Tacoma Public Library. Although no comments other than those from the Potentially Responsible Parties (PRP) were sent by the close of the public comment period, EPA shall continue to make the effort to keep the public informed and provide an opportunity for participation. This aspect of the community relations effort addresses the overriding concern expressed by citizens that information must be both accurate and timely as opposed to the information they formerly received solely through the media. The other major concern expressed is that they do not see the agencies taking corrective action on so called priority sites. The high level of community relations activities and proceeding forward with the ROD leading to remedial action are the best measures to deal with these concerns.

VI ALTERNATIVES EVALUATION - FEASIBILITY STUDY

The purpose of the FS was to develop and evaluate possible alternatives to perform site cleanup. Available technologies were screened for applicability and assembled into alternatives ranging from no action to permanent treatment of all contaminants. A total of 19 preliminary alternatives were developed, nine of which included options for groundwater extraction and treatment. Technologies considered in these alternatives included dust control, capping, stabilization, excavation with off-site landfilling, electric pyrolysis, incineration, and in situ vitrification for the soils. Groundwater extraction with wells or subsurface drain pipes was included, as was pumping of pond water. Water treatment options included activated carbon adsorption and filtration or stabilization. Ten of the preliminary alternatives, including no action, were retained after initial screening for health protection and cost.

Site conditions were evaluated and clean-up levels established based on lifetime cancer risk levels of one per ten thousand (10^{-4}) and one per 1 million (10^{-6}). Alternatives containing soil excavation were evaluated for both of these risk levels.

Table 3 contains a brief description of the 10 candidate alternatives. These alternatives were subjected to detailed analysis. According to regulatory guidelines, the detailed analysis of each alternative included:

- Refinement of the alternative with emphasis given to defining established methods of handling or treating wastes.
- Evaluation in terms of engineering implementation, reliability, anticipated performance and safety.
- An assessment of the extent to which the alternative is expected to effectively prevent or reduce the threat to public health and welfare and the environment.

- An analysis of any adverse environmental impacts and methods for reducing or eliminating these impacts.
- Detailed cost estimation, including costs associated with long-term operation and maintenance associated with the alternative.
- The degree to which each alternative conforms to federal and state requirements and regulations.
- Concerns of the community.

Table 3. Summary of Remediation Alternatives

Alternative

1 No soil or water remediation is performed. Continued groundwater monitoring. Every five years, the site is reinvestigated to determine the disposition of contamination. No other actions are conducted.

4 Source control of contaminated pond water. On-site land use restrictions are imposed to prevent future exposures to soil. Potential exposures to contaminated groundwater are controlled by water use restrictions.

5 Source control by treating contaminated surface water, management of migration of soil contamination by capping with a soil base and an asphalt surface, monitoring of groundwater, land-use restrictions and water-use restrictions on the site.

6 Treatment of pond water. Use of an impermeable cap to manage contaminant migration, and institutional controls including land-use and water-use restrictions.

9 Stabilization of surface soils exceeding one per 10,000 cancer risk to create an impermeable surface, treatment of the pond water by its use in the stabilization process, control of surface water infiltration by constructing drainage ditches, land and water use restrictions, and site monitoring.

9b Groundwater extraction and treatment used in conjunction with alternative 9.

13 Similar to Alternative 9, except that surface soils with contamination exceeding the one per one million cancer risk levels for PCBs, PAHs, and benzene are stabilized.

13b Groundwater extraction and treatment used in conjunction with alternative 13.

15 Permanent treatment of the contaminated surface soils by incineration and stabilization. Pond water is treated by its incorporation into the stabilization process. Clean backfill material is placed on the unpaved areas. Incineration residues are stabilized with the lead-contaminated wastes. The stabilized material is placed to form an impermeable cap. Groundwater monitoring and land and water use restrictions.

15b Groundwater extraction and treatment used in conjunction with alternative 15.

16 Surface-water treatment; excavation of surface and subsurface soils contaminated above the one per 10,000 risk level for PAHs; dewatering of soils as necessary for excavation and treatment of water, backfilling and compaction; grading of the site and construction of a drainage ditch to prevent surface-water ponding; repaving of areas necessary for metal recycling operations; land and water use restrictions.

16b Groundwater extraction and treatment used in conjunction with alternative 16.

18 Surface water in ponds is treated with water obtained from dewatering of soils. All contaminated soils above the one per 1 million risk level are removed and landfilled off-site. Clean soil is backfilled into the excavation pit. The soil is then compacted and graded so that surface water flows to a drainage ditch and does not pond. Ground water is monitored and temporary water use restrictions are imposed.

18b Groundwater extraction and treatment used in conjunction with alternative 18.

19 Organic contaminants in soils above the one per 1million risk level are destroyed by incineration. Soils containing lead and other heavy metals are stabilized; contaminated surface water is used in the soil stabilization process. The slurry is spread over the site and allowed to solidify into an impermeable surface. Ground water is extracted and treated until analyses indicate that the groundwater meets the cleanup levels.

The ten candidate remedial alternatives were rated according to the concerns listed above as grouped into the following five criteria:

- Technical feasibility
- Institutional requirements
- Public health impacts
- Environmental impacts, and
- Cost analysis

Table 4 contains factors which contribute to each of these five criteria.

Table 4. Detailed Evaluation Criteria

TECHNICAL FEASIBILITY

Performance
- Effectiveness
- Useful life

Reliability
- Operation and maintenance requirements
- Possible failure modes

Implementability
- Constructability
- Time

Safety
- Worker
- Neighborhood

INSTITUTIONAL REQUIREMENTS

Conformance to Applicable or Relevant and Appropriate Requirements (ARARs)
Community Concerns

ENVIRONMENTAL IMPACTS

Beneficial effects
- Final environmental conditions
- Improvements in biological community
- Improvements in resources

Adverse effects
- Construction and operation
- Mitigative measures

PUBLIC HEALTH IMPACTS

Minimization of chemical releases
Exposures during remedial action
Exposures after remedial action

COST

Capital cost
Operation and maintenance costs
Present worth

Each of the candidate alternatives was rated for the above factors according to a high/moderate/low scheme. A high rating indicated that th alternative meets or exceeds objectives for cleanup. A moderate rating indicates the alternative only partially addresses the clean-up objectives, while a low rating indicates that clean-up objectives are not met for this criteria. The ratings for each factor in general categories are then combined. These ratings for the 10 candidate alternatives are presented in Table5. As Alternatives 9, 13, 15, 16, and 18 contained options for groundwater treatment, these alternatives have two sets of ratings. The alternatives including groundwater treatment are numbered with the Symbol b (i.e. 9b).

From this evaluation a preferred remedial alternative was selected. The selection considered the degree to which site performance standards would be attained, the degree of clean up performed as required by regulations, and the degree to which routes of contaminant exposure are eliminated or controlled

Table 5. Summary of Detailed Evaluation

No.	Technical Feasibility Rating	Institutional Considerations Rating	Environmental Impacts Rating	Public Health Impacts Rating	Cost Analysis (Present Worth, Million Dollars)
I	High	Low	Moderate	Low	0.8
4	High	Low	Moderate	Moderate	1.0
5	High	Low	Moderate	High	1.7
6	High	Moderate	Moderate	High	3.8
V	High	High	Moderate	High	3.3
Vb	High	High	High	High	4.2
13	High	High	Moderate	High	3.4
13b	High	High	High	High	4.3
15	High	High	Moderate	High	8.1
15b	High	High	High	High	9.0
16	High	High	High	High	93.1
16b	High	High	High	High	93.8
18	High	High	High	High	133.1
18b	High	High	High	High	133.6
19	High	High	High	High	242.9

Note: Numbered cleanup alternatives with the Symbol b indicate ground-water extraction and treatment has been included.

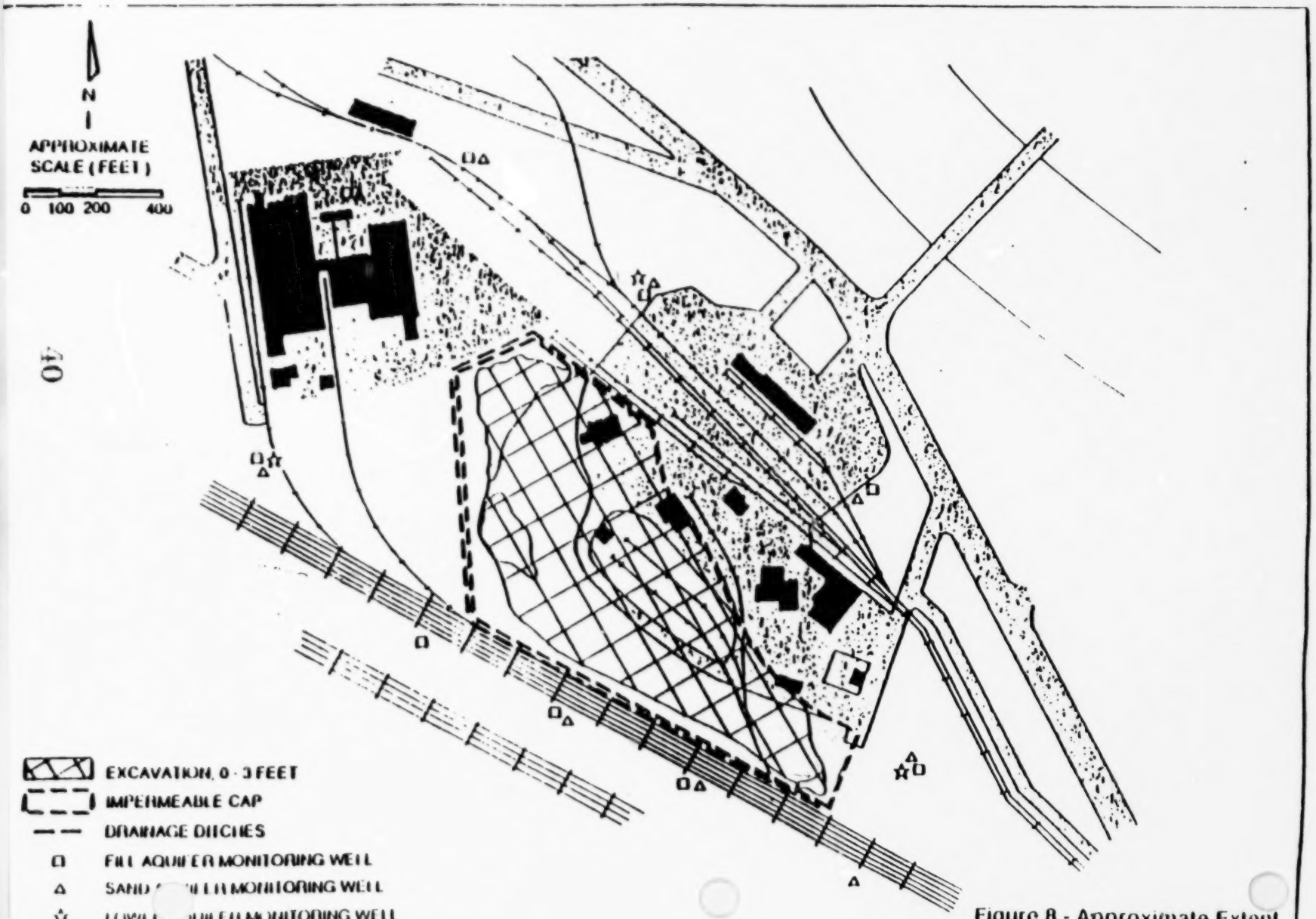

Figure 8 - Approximate Extent

VII SELECTED REMEDIAL ALTERNATIVE (No. 13)

The preferred remedial alternative (No. 13) is a combination of source control measures, measures to control contaminant release, and also measures to reduce human exposure to contaminants. This alternative consists of the excavation of the most severely contaminated soils, stabilization of these soils using a technique which immobilizes contaminants, capping of the stabilized material, treatment of surface water, continued groundwater monitoring, regulatory controls on water usage for both surface and groundwater, and restrictions on site access.

A. Description of the Selected Remedy

1. Soil Excavation

Surface soils exceeding the 10^{-6} lifetime cancer risk level, and all soils regardless of depth which are classified as Extremely Hazardous Wastes (EHW) under state law are to be excavated. Soils classified as EHW are defined as those soils exceeding 10,000 mg/kg (1 percent) PAH. Soils beneath the tar pit and ponds are known to contain PAH in excess of 1 percent. These soils will be excavated to a depth required to show PAH concentrations less than 1 percent. When the Remedial Action is undertaken, this state standard may be reevaluated for technical feasibility as allowed under §121(d)(4)(B) of SARA.

Soils and sediments from other areas will be excavated to a depth not to exceed 3 feet in all locations where soils exceed concentrations defined to have a 10^{-6} lifetime cancer risk. This 10^{-6} risk level translates to 1 mg/kg for PCB, 1 mg/kg for PAHs, and 56 mg/kg for benzene (Table 2). Surface soil contaminated with lead above the 166 mg/kg level is also excavated and stabilized. The approximate area designated for excavation is shown in Figure 8.

The total estimated volume of material to be excavated is 45,000 cubic yards. Backhoes, bulldozers, and front end loaders will be used to excavate soils. Dust control measures such as wetting of soils will be used during excavation to prevent wind dispersion. Sediments from the ponds are excavated later in the remedial action as waters must first be removed from the ponds. Operations at the metal recycling facility will be temporarily relocated when the area which is currently paved is remediated.

2. Soil Stabilization

To reduce the ability of contaminants to migrate from the soils prior to replacement on site, the excavated soils will be chemically treated or stabilized. Laboratory experiments will be performed to ensure that the stabilization process effectively immobilizes contaminants. Following this activity, a larger scale "pilot study" will stabilize a larger volume of contaminated material from the site. This pilot study will determine the effectiveness of the stabilization process.

As excavation proceeds, the contaminated material is moved to a hopper which screens out material larger than 6 inches in diameter and feeds the material to a grinder or crusher. The grinder pulverizes the material to produce particles smaller than 5 to 10mm in diameter. The material is then fed to a mixing vessel where silicate polymers, cement, and water from the site ponds is added. The waste will need to be thoroughly mixed prior to this step.

The proportions of polymer and cement to be added will be determined by laboratory scale studies. The final composition of the stabilized material may vary depending on the composition of soil encountered during excavation. It is estimated that 200 to 400 pounds of cement and polymer will be added per ton of contaminated soil, along with 10 to 25 gallons of water.

3. Replacement of Stabilized Soil

The chemical stabilization process should significantly reduce the toxicity and leachability of site soils. Therefore, this material will be placed back into the locations from which it was excavated. The stabilized soil will be dense and relatively impermeable to rainfall or surface water. To further reduce the flow of surface water through this stabilized material, an asphalt cap will be placed over the stabilized soil. An asphalt sealer will be used as part of this capping procedure.

Prior to placement of the stabilized mixture, the site surface will be graded to form a 3 percent slope toward the BN railroad tracks to the south. A furrow will be dug along the edge of these tracks and along the western side of the existing ponds to provide a drainage ditch. Clean fill material may be needed in the areas of the ponds to bring the surface up to grade. The mixture will then be spread over the area indicated in Figure 8. This process will proceed from the tar pit area toward the ponds. The material will be laid as a continuous layer and will be allowed to cure for up to 1 month.

The reagent composition is formulated to provide a high-strength surface capable of supporting trucks and other vehicles. In order to protect the stabilized surface from heavy equipment wear, a 2-inch layer of asphalt will be placed over it. The surface will be periodically inspected and, if necessary, repaired.

Land use restrictions will be imposed to prevent or require stringent control of future excavation on the site, to prevent future use of surface water and shallow groundwater, and to prevent site access by personnel other than site workers.

4. Groundwater Extraction and Treatment

At this time, it is not expected that groundwater extraction and treatment will be necessary. An expanded groundwater monitoring network utilizing to the extent practicable those wells shown in Figure 8 will be designed, and regular groundwater monitoring will be performed. To accomplish this, it is likely that additional wells will need to be installed. If concentrations are determined to be statistically representative of levels exceeding site performance standards, the need for groundwater extraction and treatment will be evaluated in a subsequent study.

At the current time, the groundwater system has been insufficiently characterized to completely design groundwater extraction and treatment systems for the fill, sand, and lower aquifers. Exact locations and depths of extraction wells cannot be specified nor can anticipated rates of groundwater extraction be estimated. Therefore, if groundwater extraction is deemed necessary, additional characterization of the hydrogeologic conditions of the site will be necessary as part of the system design.

5. Performance of the Selected Alternative

The proposed cleanup option was selected due to the fact that it provides a treatment alternative which reduces the mobility and toxicity of the contamination, will be protective of human health and the environment, attains ARARs, and is a cost-effective method of site cleanup. The benefits of this alternative are discussed below. First and foremost, human exposures to contaminated soils are prevented, thereby addressing the most significant health concern. Pond water is treated, and surface water infiltration is prevented by the impermeable cap. Thus, potential exposures via water sources are controlled. Permanent treatment can be provided through the

immobilization of contaminants. The cost of this alternative, estimated to be about $3.4 million, is significantly less than other alternatives which offer a comparable level of protection.

As required by Section 121 of CERCLA for Remedial Actions where wastes remain on-site, the performance of the remedial action will be reinvestigated every 5 years to ensure that the remedial action has been effective, that increasing levels of contaminants are not being released to the environment, and that human health and the environment are protected. If as a result of this frequent reassessment, the remedial action is shown to have decreased performance, the nature and extent of additional actions will be considered.

8. Statutory Determinations

The selected remedial alternative meets all statutory requirements, particularly those of CERCLA as amended by SARA. The highest priority is the protection of human health and the environment. The use of stabilization permanently treats/fixes contaminants. Therefore, the landfill closure and post-closure care requirements are satisfied with respect to control of soil contamination releases. In addition, tar sludge beneath the site with PAH concentrations in excess of 1 percent are removed and treated. PCB materials exceeding 50 ppm are permanently immobilized, consistent with the Toxic Substances Control Act (TSCA) regulations. Permanent treatment, as preferred under SARA, is used.

ARARs pertaining to surface water are satisfied because contaminants in existing surface water are removed to nondetectable levels. Future off-site discharges of surface water should meet discharge limits because the surface-water runoff does not flow into contaminated materials.

The release of additional contaminants to the groundwater is reduced by the placement of an impermeable cap, and the control of surface-water runo Additionally, the permanent immobilization of wastes satisfies groundwater protection regulations. Therefore, presently uncontaminated groundwater will be clearly protected, consistent with groundwater protection and nondegradation regulations. Existing contaminated groundwater within the site remains untreated; however, land use restrictions will ensure that the groundwater is not extracted or used. Action levels of contaminants in groundwater have not been consistently exceeded at off-site locations. Groundwater monitoring is conducted at the site boundaries in accordance with Resource Conservation and Recovery Act (RCRA) closure requirements to ensure that contaminated groundwater does not migrate beyond the site boundaries.

Impacts to the community are minimized through the use of this alternative. Some operations at the metal recycling facility may be suspended during the implementation of this alternative; however, following remediatio activities may resume and should not be restricted.

The cap which is produced from the stabilized soil and asphalt will be able to support driving and operation of light equipment. Large structures may be placed if support piling is included. Land use restrictions will ensure that placement of any such support is done in such a way that 1) any contaminated soil brought to the surface during placement is handled in accordance with RCRA and state hazardous waste regulations, and 2) the integrity of the cap in maintained.

The selected remedy will also meet all substantive laws and regulations of other ARARs. These are listed and their application is briefly described in the FS.

The law and regulations of concern include:

- Resource Conservation and Recovery Act (RCRA, 42 USC 6901); RCRA regulations (40 CFR 261 to 280); Washington State Dangerous Waste Regulations (WAC 173-303); Minimum Functional Standards for Solid Waste Handling (WAC 173-304).

- The selected remedy prevents further spread of groundwater contamination and constitutes a Corrective Action Program as specified in 40 CFR 264, and WAC 173-303-645(11).

- Safe Drinking Water Act (SDWA, 42 USC 300); Primary Drinking Water Standards (40 CFR 141).

- Clean Water Act (CWA, 33 USC 1251); National Pollution Discharge Elimination System (NPDES, 40 CFR 122); NPDES Permit Program (WAC 173-220).

The final selected remedy meets the requirements of cost-effectiveness as this alternative provides for permanent treatment, and contaminant release minimization for a cost significantly less than other alternatives exhibiting a similar level of protection. The estimated present worth of the selected remedy is $3.4 million, while alternatives 15, 16, 18, and 19, provide similar levels of protection for costs of $8.1, $93.1, $133.1, and $242.9 million, respectively. Additional cost of these is the result of the use of more costly technologies such as incineration (15, 19) or the excavation of larger volumes of soils coupled with off-site landfilling (16, 18).

APPENDIX I

INDEX TO ADMINISTRATIVE RECORD

ADMINISTRATIVE RECORD OF TAR PITS SITE

Doc #	File	Type/Description	Date	# Pages	Author/Organization	Addressee/Organization
00000001.	Pre Superfund Information	Research material re: Tacoma Tar Pit and Washington Natural Gas from 1924 to 1967	4/1/82	5	Kwasi Boateng, Ecology and Environment, Inc. (E&E)	John Osborn, EPA
00000002.	Pre Superfund Information	Miscellaneous data re: Tacoma Gas Plant including Washington Natural Gas Retirement Requisition	1965	10	Unknown	Unknown
00000003.	Pre Superfund Information	Permit to Appropriate Public Ground Waters of the State of Washington	9/29/67	3	Hygrade Food Products Corp.	State of Washington, Dept. Water Resources
00000004.	Pre Superfund Information	Washington Gas and Electric Company diagram of Tacoma Gas Plant, newspaper articles	1950s	5	Washington Gas and Electric	The News Tribune, Tacoma Public Library Files
00000005.	Pre Superfund Information	Material list and stores issued to contractor	8/23/56	1	T. Milligan, Washington Natural Gas	Unknown
00000007.	Pre Superfund Information	Letter re information on old Tacoma Manufactured Gas Plant	11/5/82	2	T. Hogan, Washington Natural Gas	Robert Poss, EPA
00000008.	Pre Superfund Information	"Commencement Bay - Nearshore/Tideflats Drainage System Investigation	7/1/83	38	Tacoma-Pierce County Health Dept.	Washington DOE
00000009.	Preliminary Site Investigation	Memo re preliminary field investigation, Tacoma "Tar Pit," site history search, attached diagrams, preliminary assessment form, enforcement profile map	3/30/82	12	Hussein Aldis, Ecology and Environment	John Osborn, EPA
00000010.	Preliminary Site Investigation	Letter re Joseph Simon and Sons, Inc., and site investigation of study area	8/10/82	1	Roy Kussman of McCavick, Graves, Beale & McHerthney	Robert Poss, EPA
00000011.	Preliminary Site Investigation	Letter re site investigation of Tacoma Tar Pits by PRPs	9/1/82	1	D. Bell, Burlington Northern	Robert Poss, EPA

Doc #	File	Type/Description	Date	# Pages	Author/Organization	Addressee/Organization
00000012.	Preliminary Site Investigation	Letter re Union Pacific involvement in initial site investigation	8/31/82	2	Jeff Asay, Union Pacific Railroad Co.	Robert Poss, EPA
00000013.	Preliminary Site Investigation	Letter re involvement of Washington Natural Gas in preliminary site investigation	10/1/82	1	Timothy Hogan, Washington Natural Gas	Robert Poss, EPA
00000014.	Preliminary Site Investigation	Letter re preliminary site investigation with attached comments of EPA on proposal by Kennedy/Jenks Engineers	10/25/82	4	Robert Poss, EPA	Mike Cook, Burlington Northern
00000015.	Preliminary Site Investigation	Letter re Tacoma Tar Pits investigation consent order	11/9/82	2	Roy Kussmann of McCavick, Graves, Beale & McNerthney	Cheryl Koshuta, EPA
00000016.	Preliminary Site Investigation	Letter re participation of Hygrade Food Products in site investigation of Tacoma Tar Pits	11/11/82	2	Douglas Ehlke, Douglas B. Ehlke & Assocs.	Timothy Hogan, Washington Natural Gas
00000017.	Preliminary Site Investigation	Letter re participation of Hygrade Food Products in site investigation of Tacoma Tar Pits, and response to Administrative Order	11/12/82	1	Douglas Ehlke, Douglas B. Ehlke & Assocs.	Cheryl Koshuta, EPA
00000018.	Preliminary Site Investigation	Letter re participation of Joseph Simon & Sons in site investigation of Tar Pits	7/30/82	2	Robert Poss, EPA	Philip Simon, Joseph Simon & Sons
00000019.	Preliminary Site Investigation	Memo re assistance for Tacoma Tar Pits site investigation in sample analysis	1/24/83	2	Judy Schwarz, EPA	Bill Schmidt, EPA
00000020.	Preliminary Site Investigation	Letter with attached map and diagram re proposed locations of wells and sampling sites at Tacoma Tar Pits	2/4/83	5	James Dragun, Kennedy/Jenks Engineers, Inc.	Judy Schwarz, EPA
00000021.	Preliminary Site Investigation	Draft report entitled "Soil and Ground Water Contamination Assessment of Commencement Bay Tar Pits"	5/83	84	Kennedy/Jenks Engineers on behalf of Burlington Northern Railroad, Hygrade Food Products, Joseph Simon & Sons	
00000022.	Preliminary Site Investigation	Letter re Washington DOE's comments on draft report on soil and groundwater contamination by Kennedy/Jenks Engineers	7/18/83	3	Jim Oberlander, WDOE	Judy Schwarz, EPA

Doc#	File	Type/Description	Date	# Pages	Author/Organization	Addressee/Organization
00000023.	Preliminary Site Investigation	Letter re modification of proposal for soil and groundwater contamination assessment of Commencement Bay Tar Pits	9/30/82	2	Roger Adams, Kennedy/Jenks Engineers	Michael Cook, Burlington Northern RR
00000024.	Preliminary Site Investigation	Letter re Washington DOE's comments on Groundwater Contamination Assessment Report of 8/83	9/7/83	1	Washington DOE	Judy Schwarz, EPA
00000025.	Technical Directive Document	Memo re property ownership for area surrounding Tacoma Tar Pits with attached landowner list	3/7/84	6	Hussein Aldis, Ecology and Environment, Inc.	John Osborn, EPA
00000026.	Work plan/assignments/ amendments	Report entitled "Final Work Plan, Remedial Investigation/Feasibility Study, Tacoma Tar Pits"	5/18/84	140	Eric G. Lappala, John G. Catts, Harding Lawson Assocs.	EPA
00000027.	Work plan/assignments/ amendments	Letter re scope of work for assessment of soil and groundwater contamination at Commencement Bay Tar Pits, with attachments re: protective equipment, monitoring and sampling locations, on-site contamination assessment	5/24/84	16	Roger Adams, Kennedy/Jenks Engineers	Charles Blumenfeld, Bogle & Gates
00000028.	Work plan/assignments/ amendments	Work plan re Remedial Investigation/ Feasibility study of soil and groundwater contamination	6/25/84	12	Kennedy/Jenks Engineers	EPA
00000029.	Work plan/assignments/ amendments	Letter re Washington DOE's comments on a final workplan for RI/FS with attached copy of WDOE's draft cleanup policy	9/14/84	9	Megan White, WDOE	Wayne Grotheer, EPA
00000030.	Work plan/assignments/ amendments	Report entitled "Draft Workplan, Remedial Investigation/Feasibility Study	10/30/84	20	Applied Geotechnology	EPA
00000031.	Work plan/assignments/ amendments	Letter re proposed modification of workplan for RI/FS, Tacom Tar Pits, with attached maps of proposed well locations	11/9/84	4	Mark Adams, Applied Geotechnology	Wayne Grotheer, EPA
00000032.	Work plan/assignments/ amendments	Memo re meeting on proposed modifications to RI/FS workplan with attached handwritten notes re: same meeting	1/9/85	7	Wayne Grotheer, EPA	Meeting attendees

Doc#	File	Type/Description	Date	# Pages	Author/Organization	Addressee/Organizati
00000033.	Work plan/assignments/ amendments	Letter/proposal re proposed scope of work to address data gaps in Remedial Investigation/Feasibility Study for Tacoma Tar Pits	8/14/85	6	Mark Adams, Applied Geo-technology	Wayne Grotheer, EPA
00000034.	Work plan/assignments/ amendments	Letter re EPA's comments on proposed scope of work and schedule for Remedial Investigation/Feasibility Study	8/85	2	Wayne Grotheer, EPA	Mark Adams, Applied Geotechnology
00000035.	Work plan/assignments/ amendments	Letter and attached report entitled "Supplement Work Plan and Quality Assurance Plan for Remedial Investigation	10/4/85	21	Mark Adams, Applied Geotech-nology	Wayne Grotheer, EPA
00000036.	Work plan/assignments/ amendments	Letter re final workplan for well installation and sampling program Work assignment 95-0611.1	9/5/86	3	Joan Stoupa, CH2MHill	Wayne Grotheer, EPA
00000037.	Work plan/assignments amendments	Work plan approval for well installation and sampling by CH2MHill	9/5/86	1	Wayne Grotheer, EPA	Wayne Sellman, EPA
00000038.	Work plan/assignments/ amendments	Report entitled "Technical Work Plan Remedial Investigation/Feasibility Study, Tacoma Tar Pits"	9/2/86	9	Harding Lawson Associates	CH2MHill
00000039.	Work plan/assignments/ amendments	Letter with attached schedule re revised project schedule for Tacoma Historical Coal Gasification site	3/10/87	2	Spyros Pavlou, Envirosphere Company	Wayne Grotheer, EPA
00000040.	Remedial Investigation Reports, Folder 1, drafts and comments	Tacoma Tar Pits RI - draft information package	5/28/85	56	Applied Geotechnology	Unknown
00000041.	Remedial Investigation Reports, Folder 1, drafts and comments	Letter re review of Applied Geotechnology's package	6/21/85	3	John Catts, Harding Lawson Associates	Wayne Grotheer, EPA
00000042.	Remedial Investigation Reports, Folder 1, drafts and comments	Vol. 1, Preliminary Draft RI, Tacoma Tar Pits	6/28/85	149	Applied Geotechnology on behalf of Washington Natural Gas, Joseph Simon, Hygrade Food Products, Burlington Northern Railroad	
00000043.	Remedial Investigation Reports, Folder 1, draft and comments	Vol. 2, Preliminary Draft RI appendices, Tacoma Tar Pits	6/28/85	141	Applied Geotechnology on behalf of Washington Natural Gas, Joseph Simon & Sons, Hygrade Food Products, Burlington Northern Railroad	

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00000044.	Remedial Investigation Reports, Folder 1, drafts and comments	Letter re Washington DOE's comments on preliminary RI submitted by Applied Geotechnology	7/23/85	5	Megan White, WDOE	Wayne Grotheer, EPA
00000045.	Remedial Investigation Reports, Folder 1, drafts and comments	Letter re comments on preliminary RI submitted by Applied Geotechnology and FS progress report submitted by Howard, Needles, et al.	8/6/85	7	John Catts, Harding Lawson Assocs.	Wayne Grotheer, EPA
00000046.	Remedial Investigation Reports, Folder 1, drafts and comments	Letter re EPA comments on preliminary RI submitted by Applied Geotechnology	8/8/85	4	Wayne Grotheer, EPA	Mark Adams, Applied Geotechnology
00000047.	Remedial Investigation Reports, Folder 1, drafts and comments	Memo/attachments re comments on draft RI report by Wilson (EPA), Sceva (EPA), E&E, Watson (EPA)	4/14/86	15	John Osborn, EPA	Wayne Grotheer, EPA
00000048.	Remedial Investigation Reports, Folder 1, drafts and comments	Letter re Washington DOE's comments on final draft Remedial Investigation reports prepared by Applied Geotechnology	4/16/86	7	Megan White, WDOE	Wayne Grotheer, EPA
00000049.	Remedial Investigation Reports, Folder 1, drafts and comments	Letter re significant data gap in Remedial Investigation Report by Applied Geotechnology	4/85	2	Wayne Grotheer, EPA	Mark Adams, Applied Geotechnology
00000050.	Remedial Investigation Reports, Folder 1, drafts and comments	Letter re EPA comments on final draft RI	5/86	9	Wayne Grotheer, EPA	Mark Adams, Applied Geotechnology
00000051.	Remedial Investigation Reports, Folder 2, drafts and comments	Draft final report - supplemental ground water investigation, RI/FS, Tacoma Tar Pits	5/7/87	46	Harding Lawson Assocs. for CH2MHill	
00000052.	Remedial Investigation Reports, Folder 2, drafts and comments	Final report - supplemental groundwater investigation, RI/FS, Tacoma Tar Pits	7/7/87	45	Harding Lawson Assocs. for CH2MHill	
00000053.	Remedial Investigation Reports, Folder 2, drafts and comments	Final draft - Vol. 1, Remedial Investigation Report, Tacoma Tar Pits	3/86	189	Applied Geotechnology on behalf of Washington Natural Gas, Joseph Simon & Sons, Hygrade Food Products, Burlington Northern Railroad	

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00000054.	Remedial Investigation Reports, Folder 2, drafts and comments	Final draft - Vol. 2, Remedial Investigation Reports Appendices, Tacoma Tar Pits	3/86	253	Applied Geotechnology on behalf of Washington Natural Gas, Joseph Simon & Sons, Hygrade Food Products, Burlington Northern Railroad	
00000055.	Risk assessment/feasibility study, Folder 1	Progress report - feasibility study	6/85	66	Howard, Needles, Tammen & Bergendoff, Mackey Smith	Applied Geotechnolo
00000056.	Risk assessment/feasibility study, Folder 1	Draft - interim deliverables Risk Assessment and Feasibility Study for the Tacoma Historical Coal Gasification site	2/28/86	71	Envirosphere Company on behalf of Washington Natural Gas, Joseph Simon & Sons, Hygrade Food Products, Burlington Northern Railroad	
00000057.	Risk assessment/feasibility study, Folder 1	Letter re review of interim RA/FS deliverables, Tacoma Tar Pits	3/8/86	3	John Catts, Harding Lawson Associates	Wayne Grotheer, EPA
00000058.	Risk assessment/feasibility study, Folder 1	Letter re Washington DOE's comment on interim RA/FS deliverable prepared by Envirosphere Company	3/18/86	3	Megan White, WDOE	Wayne Grotheer, EPA
00000059.	Risk assessment/feasibility study, Folder 1	Letter re EPA comment on draft RA/FS	3/26/86	7	Wayne Grotheer, EPA	Spyros Pavlou, Envirosphere
00000060.	Risk assessment/feasibility study, Folder 1	Letter r Envirosphere's response to comments on contaminant selection and risk levels RA/FS. Tacoma Historical Coal Gasification Site & attached letter, 3/19/86, Pavlou to Grotheer, re response to review comments on interim RA/FS deliverables - Tacoma Historical Coal Gasification	4/86	9	Wayne Grotheer, EPA	Spyros Pavlou, Envirosphere
00000061.	Risk assessment/feasibility study, Folder 1	Letter and attachments re EPA comments on draft risk assessment	6/10/86	4	Wayne Grotheer, EPA	Spyros Pavlou, Envirosphere
00000062.	Risk assessment/feasibility study, Folder 1	Draft - RA/FS of the Tacoma Historical Coal Gasification Site	4/86	141	Envirosphere	Washington Natural Gas, Simon & Sons, Hygrade Food Products Burlington Northern Railroad
00000063.	Risk assessment/feasibility study, Folder 1	Letter and attachments re Washington DOE's comments on draft Risk Assessment	7/15/86	5	David Bradley, WDOE	Spyros Pavlou, Envirosphere

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00000064.	Risk assessment/feasibility study, Folder 1	Letter with comments of Harding Lawson Associates on RA/FS prepared by Envirosphere	8/18/86	8	John Catts, Harding Lawson Associates	Wayne Grocheer, EPA
00000065.	Risk assessment/feasibility study, Folder 1	Letter and attachments re Envirosphere's response to comments by EPA and Washington DOE on RA	8/21/86	10	Spyros Pavlou, Envirosphere	Wayne Grotheer, EPA
00000066.	Risk assessment/feasibility study, Folder 1	Letter with attachment re Washington DOE comments on Chapter Four Feasibility Study for Tacoma Historical Coal Gasification Site	9/2/86	5	David Bradley, WDOE	Wayne Grotheer, EPA
00000067.	Risk assessment/feasibility study, Folder 1	Letter with attachments re EPA comments on FS	9/17/86	8	Wayne Grotheer, EPA	Spyros Pavlou, Envirosphere
00000068.	Risk assessment/feasibility study, Folder 1	Memo with attachments re comments from Office of Toxic Substances on RA submitted	10/16/86	6	Terry O'Bryan, EPA	Patricia Storm, EPA
00000069.	Risk assessment/feasibility study, Folder 1	Letter and attachments re Envirosphere response to EPA/Washington DOE comments draft FS by Envirosphere	11/13/86	28	Spyros Pavlou, Envirosphere	Wayne Grotheer, EPA
00000070.	Risk assessment/feasibility study, Folder 1	Draft - Risk Assessment and Feasibility Study of the Tacoma Historical Coal Gasification Site	1986	148	Envirosphere on behalf of Washington Natural Gal, Joseph Simon & Sons, Hygrade Food Products, Burlington Northern Railroad	
00000071.	Risk assessment/feasibility study, Folder 2	Final Report - Risk Assessment of the Tacoma Historical Coal Gasification Site	7/87	196	Envirosphere on behalf of Washington Natural Gas, Joseph Simon & Sons, Hygrade Food Products, Burlington Northern Railroad	
00000072.	Risk Assessment/Remedial Investigation/Feasibility Study (RA/RI/FS) Correspondence	Memo re request for authorization	9/19/83	3	Gene Lucero, EPA	Lee Thomas, EPA to proceed with RI/FS
00000073.	RA/RI/FS Correspondence	Letter re questions and comments on EPA proposed RI/FS	12/7/83	2	William Francis, Burlington Northern Railroad	Robert Poss, EPA

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00000074.	RA/RI/FS Correspondence	Memo and attachment re defining main points of surface water discharge and monitoring water quality & flow for RI	2/21/84	2	James Mitchell, Tacoma-Pierce County Health Dept.	Doug Pierce, Tacoma-Pierce County Health Dep
00000075.	RA/RI/FS Correspondence	Letter re proposed consent order No. 1084-06-08-106	8/2/84	1	John Hamill, EPA	Charles Blumenfeld, Bogle & Gates
00000076.	RA/RI/FS Correspondence	Letter re consent order No. 1084-06-08-106 for RIFS	8/13/84	2	Jeffrey Leppo, Bogle & Gates	David Heineck, EPA
00000077.	RA/RI/FS Correspondence	Letter re RI/FS request for consent for access to Joseph Simon & Sons sites	8/23/84	2	David Heineck, EPA	Jeffrey Leppo, Bogle & Gates
00000078.	RA/RI/FS Correspondence	Decision memorandum re EPA's decision to proceed with RI/FS	8/24/84	5	Wayne Grotheer, EPA	Jim Everts, EPA
00000079.	RA/RI/FS Correspondence	Site safety plan for RI	9/9/84	3	Environmental Research Group, Inc., Donald Woods - CIH	Unknown
00000080.	RA/RI/FS Correspondence	Letter re Proposed Administrative Order on Consent for Privately Funded RI/FS	9/11/84	2	James Everts, EPA	James Beard, Douglas Fhike & Assocs.
00000081.	RA/RI/FS Correspondence	Letter re Proposed Administrative Order on Consent for Privately Funded RI/FS	9/11/84	2	James Everts, EPA	Charles Brown, Burlington Northern, Inc.
00000082.	RA/RI/FS Correspondence	Letter re Proposed Administrative Order on Consent for Privately Funded RI/FS	9/11/84	2	James Everts, EPA	Charles Blumenfeld, Bogle & Gates
00000083.	RA/RI/FS Correspondence	Letter re Proposed Administrative Order on Consent for Privately Funded RI/FS	9/11/84	2	James Everts, EPA	Timothy Hogan, Washington Natural Gas
00000084.	RA/RI/FS Correspondence	Memo re Addendum to Decision Memorandum of 8/24/84 re EPA's decision to proceed with RI/FS	9/14/84	1	Wayne Grotheer, EPA	James Everts, EPA
00000085.	RA/RI/FS Correspondence	Letter re response to EPA decision to reject Proposed Administrative Order on Consent	9/17/84	3	Charles Blumenfeld, Bogle & Gates	James Everts, EPA
00000086.	RA/RI/FS Correspondence	Letter re EPA rejection of Administrative Order on Consent & Decision to Proceed with EPA's RI/FS	9/28/84	1	James Everts, EPA	Timothy Hogan, Washington Natural Gas

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00000087.	RA/RI/FS Correspondence	Letter and attachments re consent for access to property	9/18/84	4	Wayne Grotheer, EPA	Robert Gower, City of Tacoma, Property right-of-way Manager
00000088.	RA/RI/FS Correspondence	Letter re access by EPA to property of Hygrade Food Products	9/21/84	3	James Beard of Douglas B.M. Ehlke & Assocs.	David Heineck, EPA
00000089.	RA/RI/FS Correspondence	Letter re rejection of Consent Order by EPA and possibility of reopening of discussions about a privately-financed RI/FS	9/28/84	2	Charles Blumenfeld, Bogle & Gates	Ernesta Barnes, EPA
00000090.	RA/RI/FS Correspondence	Letter in response to proposal re reopening of discussions for a privately-financed RI/FS	10/10/84	1	James Everts, EPA	Charles Blumenfeld, Bogle & Gates
00000091.	RA/RI/FS Correspondence	Consent for access to property with attached maps	9/20/84	6	City of Tacoma	EPA
00000092.	RA/RI/FS Correspondence	Memo re addendum to decision memo re EPA's decision to proceed with RI/FS	10/16/84	2	Wayne Grotheer, EPA	James Everts, EPA
00000093.	RA/RI/FS Correspondence	Memo re concurrence on issuance of Cercla 106(a) administrative order on consent	11/1/84	1	Francis Biros, EPA	Ernesta Barnes, EPA
00000094.	RA/RI/FS Correspondence	Letter and attachment re need for additional soil-borings at Tar Pits site and impact of delays in submitting proposed second and third round testing procedure	5/8/85	4	David Heineck, EPA	Charles Blumenfeld, Bogle & Gates
00000095.	RA/RI/FS Correspondence	Letter re response to proposal for second and third round sampling parameters and request certain information re possible data gaps in RI/FS	5/9/85	2	Wayne Grotheer, EPA	Mark Adams, Applied Technology
00000096.	RA/RI/FS Correspondence	Letter re review of Applied Geotechnology progress report No. 4 and second and third round sampling plan	5/13/85	3	John Catts, Harding Lawson Associates	Wayne Grotheer, EPA
00000097.	RA/RI/FS Correspondence	Letter re second and third round sampling	5/85	1	Wayne Grotheer, EPA	Mark Adams, Applied Geotechnology

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00000098.	RA/RI/FS Correspondence	Cover letter (without attachments) re EPA guidance relating to RI/FS	6/26/85	1	David Heineck, EPA	Charles Blumenfeld, Bogle & Gates
00000099.	RA/RI/FS Correspondence	Letter and attachments re revised project schedule and additional data needs re RI/FS	7/22/85	5	David Heineck, EPA	Charles Blumenfeld, Bogle & Gates
00000100.	RA/RI/FS Correspondence	Letter and attachments re revised schedule for completion of RI/FS	4/14/86	3	Timothy Hogan, Washington Natural Gas	David Heineck, EPA
00000101.	RA/RI/FS Correspondence	Letter re disapproval of proposed modifications to work plan for RI/FS and and attached letter from Applied Geotechnology re additional two deep wells	5/30/86	12	Timothy Hogan, Washington Natural Gas and Charles Blumenfeld, Bogle & Gates	Wayne Grotheer, EPA
00000102.	RA/RI/FS Correspondence	Letter re request for installation of two additional deep wells	5/7/86	3	Mark Adams, Applied Geo-technology	Wayne Grotheer, EPA
00000103.	RA/RI/FS Correspondence	Letter re additional monitoring wells	7/15/86	3	Charles Findley, EPA	Charles Blumenfeld, Bogle & Gates
00000104.	RA/RI/FS Correspondence	Letter re two additional monitoring wells	7/15/86	3	Charles Findley, EPA	Timothy Hogan, Washington Natural Gas
00000105.	RA/RI/FS Correspondence	Letter re additional monitoring wells	6/18/86	2	Charles Findley, EPA	Timothy Hogan, Washington Natural Gas
00000106.	RA/RI/FS Correspondence	Letter re two deep monitoring wells	8/6/86	1	Timothy Hogan, Washington Natural Gas and Charles Blumenfeld, Bogle & Gates	Charles Findley, EPA
00000107.	RA/RI/FS Correspondence	Letter and attached maps re EPA request to Burlington Northern for access to property	8/8/86	6	David Heineck, EPA	Michael Cook, Burlington Northern, Inc.
00000108.	RA/RI/FS Correspondence	Letter re EPA request to Union Pacific Railroad for access to property		2	David Heineck, EPA	Jeffrey Asay, Union Pacific Railroad
00000109.	RA/RI/FS Correspondence	Letter and attached maps re EPA's request to Union Pacific Railroad for access to property	8/19/86	5	Jeffrey Asay, Union Pacific Railroad	David Heineck, EPA
00000110.	RA/RI/FS Correspondence	Letter and attached maps re consent for access to Union Pacific Railroad's property	9/2/86	5	Jeffrey Asay, Union Pacific Railroad	David Heinick, EPA

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00000111.	RA/RI/FS Correspondence	Letter re consent for access to Union Pacific Railroad property	9/12/86	1	David Heineck, EPA	Jeffrey Asay, Union Pacific Railroad
00000112.	RA/RI/FS Correspondence	Letter re selection of drilling sub-contractor for installation of two monitoring wells/attached proposal and bid information	9/18/86	14	John Catts, Harding Lawson Associates	Wayne Grotheer, EPA
00000113.	RA/RI/FS Correspondence	Letter re EPA request for consent for access to Burlington Northern property	9/23/86	1	David Heineck, EPA	Mel Burda, Burlington Northern
00000114.	RA/RI/FS Correspondence	Letter re EPA's request to Burlington Northern for consent for access to property	10/1/86	1	David Heineck, EPA	John Catts, Harding Lawson & Assoc.
00000115.	RA/RI/FS Correspondence	Letter and attachments re revised list of of final candidate alternatives, Tacoma Historical Gasification site	4/7/87	3	Matthew Schulz, Envirosphere	Wayne Grotheer, EPA
00000116.	RA/RI/FS Correspondence	Letter re delay in submittal of RI	6/19/87	1	Mark Adams, Applied Geotechnology	Wayne Grotheer, EPA
00000117.	RA/RI/FS Correspondence	Letter re EPA comment on revised list of candidate alternatives	5/87	3	Wayne Grotheer, EPA	Matthew Schultz, Envirosphere
00000118.	RA/RI/FS Consent Orders	Administrative Order on consent #1084-06-08-106 with attached work plan RI/FS	11/1/84	33	Ernest B. Barnes, EPA	Joseph Simon & Sons, Inc. Washington Natural Gas Company, Burlington Northern Railroad, Nygrade Food Products
00000119.	Contract Management Documents	EPA Summary Evaluation Report (SER) with attachments of description of activities and performance, SER	10/28/86	12	Wayne Grotheer, EPA	
00000120.	Contract Management Documents	Statement of Work, Tacoma Tar Pits Site Well installation and sampling	6/30/86	2	Wayne Grotheer, EPA	
00000121.	Contract Management Documents	Letter: Progress report on work for new wells on Tar Pits site	8/11/86	2	Kathleen Nieson, CH2MHILL	Wayne Grotheer, EPA
00000122.	Contract Management Documents	Bid documents for groundwater monitoring well installation	9/2/86	41	Harding Lawson Assoc.	

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00000126.	Quality Assurance Project Plan	Letter re comments on draft QAPP	9/21/84		Wayne Grotheer, EPA	John G. Catts, Hardi Lawson Associates
00000127.	Quality Assurance Project Plan	Quality Assurance Project Plan Remedial Investigation Feasibility Study - draft	9/26/86	49	Harding Lawson Associates	CH2MHill
00000128.	Quality Assurance Project Plan	Quality Assurance Project Plan Remedial Investigation Feasibility Study	10/19/84	53	Harding Lawson Associates	CH2MHill, EPA
00000129.	Quality Assurance Project Plan	Letter re clarification RI/FS/QAPP	10/24/84	2	Kathleen Nieson, CH2MHill	Wayne Grotheer, EPA
00000130.	Quality Assurance Project Plan	Letter re Cercla Administrative Order No. 1084-06-08-106 (Quality Assurance for sampling data)	11/27/84	3	David Heineck, EPA	Charles Blumenfeld, Bogle & Gates; Timot J. Hogan, Washington Natural Gas
00000267.	Quality Assurance Project Plan	Letter re soil resistivity survey and soil borings with attachments/map	12/5/84	4	Mark Adams, Applied Geotechnology, Inc.	Wayne Grotheer, EPA
00000131.	Quality Assurance Project Plan	Quality Assurance Project Plan/Remedial Investigation/Feasibility Study	2/85	60	Applied Geotechnology, Inc.	Wayne Grotheer, EPA
00000132.	Quality Assurance Project Plan	Letter re comments on QAPP; bid document, technical workplan	8/22/86	2	Wayne Grotheer, EPA	Kathleen Nieson, CH2M
00000133.	Quality Assurance Project Plan	Workplan; Quality Assurance Project Plan/ Remedial Investigation/Feasibility Study	9/2/86	7	John Catts, Harding Lawson Associates	CH2MHill, EPA
00000134.	Public Health Assessment	Memo re preliminary health assessment, Tacoma Tar Pits site (SI-86-219)/Health Assessment and Consultation Report	12/17/86	18	Director, Department of Health & Human Services	Joel Mulder, EPA
00000135.	Memorandum	Re Tacoma Tar Pits RI/FS--consistency with SARA requirements	3/12/87	3	Wayne Grotheer, EPA	
00000136.	Reference materials or listing of guidance documents	Guidances for administrative records located in EPA regional files		2	EPA	
00000137.	Community relations and news releases	News releases "For Immediate Release," Commencement Bay and the Tar Pits	7/15/83	2	DOE	

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0000138.	Community relations and news releases	Letter re citizen advisory committee with with attached list of members	8/30/83	3	Doug Pierce, Environmental Health Division, Tacoma-Pierce County Health Dept.	Jim Krull, WDOE
0000139.	Community relations and news releases	Letter to all interested citizens re investigation of soil and groundwater in South Tacoma		2	Phil Wong, EPA	Interested citizens
0000140.	Community relations and news releases	Memo and attached community relations plan	2/27/87	6	Judy Schwarz, EPA	Daphne Gimmell, Superfu Community Relations Coordinator
0000141.	Community relations and news releases	Fact sheet and letter to all interested citizens	9/84	3	Wayne Grotheer, EPA	Interested citizens
0000142.	Community relations and news releases	News release re EPA work on Tacoma Tar Pits	10/24/84	3	Wayne Grotheer, EPA	
0000143.	Community relations and news releases	News releases re property owners agreement to perform Superfund investigation	11/14/84	1	Wayne Grotheer, EPA	
0000144.	Community relations and news releases	Superfund citizens advisory committee agenda, with attachments including graphs and maps	7/22/86	11	Tacoma-Pierce County Health Dept.	
0000145.	Community relations and news releases	PCB cleanup press release	3/23/87	2	D. Cohen, EPA	
0000146.	Newspaper articles	Bright Future for Gas Industry Forecast Here	9/9/54	1	Tacoma Public Library files	
0000147.	Newspaper articles	Natural gas pipeline already halfway here		1	Tacoma Public Library files	
0000148.	Newspaper articles	Industrial leaders		1	Tacoma Public Library files	
0000149.	Newspaper articles	Gas company is 50 years old this month		1	Tacoma News Tribune, Tacoma Public Library files	
0000150.	News paper articles	Terrible! Tide flats to tar pits	7/23/83	1	The News Tribune, Tacoma, WA	
0000151.	Newspaper articles	Toxins found in Tar Pits	7/23/83	1	Pierce County Herald, Puyallup, WA	
0000152.	Newspaper articles	Gunk delays spur work	5/17/84	1	The News Tribune, Tacoma, WA	

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00000153.	Newspaper articles	EPA set to spend $410,000 on Tar Pits	9/13/84	1	Jeff Weatherby, The News Tribune, Tacoma, WA	
00000154.	Newspaper articles	Tar Pits face cleanup	11/3/84	1	Pierce County Herald, Puyallup, WA	
00000155.	Treatability studies	Memo re SITE (Superfund Innovative Technology Evaluation) program, nomination of Superfund sites	11/12/86	1	James Evert, EPA	Donald C. White, EPA
00000156.	Treatability studies	Superfund innovative technology evaluation program; description of technology process demonstrated - electric pyrolyzer		11	EPA	
00000157.	Treatability studies	Westinghouse Electric Pyrolyzer general information re use at Tar Pit site.	1/21/87	2		
00000158.	Treatability studies	Letter re Westinghouse program participation with electric pyrolyzer	5/4/87	2	R. P. Gepco, Manager, Westinghouse electric pyrolyzer	Ronald D. Hill, EPA
00000159.	Treatability studies	Memo re teleconference with Region 10, Westinghouse and OERR on demonstration of the pyrolyzer at Tacoma Tar Pit site	2/6/87	3	Linda Galer, EPA	John Kingscott, EPA
00000161.	Treatability studies	Status of EPA evaluation of site nominations for the SITE program. Attached: SITE operations plan	3/87	39	EPA	
00000162.	Treatability studies	Memo re answers to incineration tough questions for the electric pyrolyzer/ Tacoma Tar Pits site demonstration. Attached: incineration tough questions	4/6/87	4	Linda Galer, EPA	Tim Princefield, EPA
00000163.	Treatability studies	Memo re coordination meeting for Westinghouse pyrolyzer/Tacoma Tar Pits SITE demonstration. Attached agenda and list of participants.	3/18/87	4	Linda Galer, EPA	Wayne Grotheer, EPA, Russ Sepco, Westinghouse, Norma Lewis, ORD
00000164.	Pilot/bench studies	Letter re comments on soil stabilization pilot study proposal with attached memos from Megan White, WDOE, and from Mike Gallagher	2/5/87	6	David Bradley, WDOE	Wayne Grotheer, EPA

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00000165.	Applicable or relevant and appropriate requirements	Letter with enclosed listing of state ARARS	5/18/87	8	David Bradley, WDOE	Dr. Spyros Pavlou, Envirosphere
00000166.	Lab reports/raw data	Olympia Environmental Laboratory data summary with attached inspection reports, news release	9/11/81	8	G. Freeman, WDOE	
00000167.	Lab reports/raw data	Letter re laboratory analysis notice for Tacoma Tar Pits with attached water samples and lab report	6/14/83	13	Robert A. Poss, EPA	Michael L. Cook, Burlington Northern Railroad
00000168.	Lab reports/raw data	Letter re laboratory analysis notice for for Tacoma Tar Pits with attached water samples and sediment samples	6/14/83	11	Robert A. Poss, EPA	Philip Simon, Joseph Simon & Sons
00000169.	Lab reports/raw data	Letter and attached toxicity report	9/9/83	2	M. L. Cook, Burlington Northern Railroad	EPA
00000170.	Lab reports/raw data	Organic traffic reports and chain of custody records, Case No. 3467	10/29/84	29	EPA	Science Applications, Inc.
00000171.	Lab reports/raw data	Letter with attached lab results (location of lab results, EPA regional file)	1/8/85	77	Analytical Technologies	Applied Geotechnology, Inc.
00000172.	Lab reports/raw data	Letter re Tar Pits RI/FS #14880.002 with attached test results (test results located at EPA regional file)	1/8/85	48	John W. Strand, Analytical Technologies, Inc.	Applied Geotechnology
00000173.	Lab reports/raw data	Organic analysis data sheet (located at EPA regional file)	2/13/85	51	EPA	
00000174.	Lab reports/raw data	Letter with attached test results and quality control data (lab results at EPA EPA regional file)	1/28/85	53	John W. Strand, Analytical Technologies, Inc.	Applied Geotechnology
00000175.	Lab reports/raw data	Letter with attached analytical results #14880.002 (lab results located at EPA regional file)	2/5/85	53	John W. Strand, Analytical Technologies, Inc.	Applied Geotechnology
00000176.	Lab reports/raw data	Letter regarding EPA contract 68-01-6851 with attached data report (data at EPA regional file)	2/6/85	307	William H. Vick, Science Applications International Corp.	John Osborn, EPA

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00000177.	Lab reports/raw data	Letter regarding Tar Pits RI/FS with attached test results and quality control data (lab results located at EPA regional file)	2/11/85	25	James Bentley, Analytical Technologies, Inc.	Applied Geotechnology
00000178.	Lab reports/raw data	Transmittal memo with enclosed copies of rough field logs from Tar Pits soil boring #14880.002	2/19/85	18	Mark Adams, Applied Geotechnology, Inc.	Wayne Grotheer, EPA
00000179.	Lab reports/raw data	Letter with attached test results and quality control data #14880.002 (lab reports located at EPA regional file)	2/18/85	54	John W. Strand, Analytical Technologies, Inc.	Mark Adams, Applied Geotechnology, Inc.
00000180.	Lab reports/raw data	Report of evaluation of case 3467, Tacoma Tar Pits data	3/1/85	8	G. Muth, EPA	
00000181.	Lab reports/raw data	Letter with enclosed data sheets, sample TP-MCI-W1. (Data sheets located at EPA regional files)	3/4/85	23	John W. Strand, Analytical Technologies, Inc.	Mark Adams, Applied Geotechnology, Inc.
00000182.	Lab reports/raw data	Letter with attachment data #14880.002	3/6/85	2	John W. Strand, Analytical Technologies	Applied Geotechnology
00000183.	Lab reports/raw data	Letter with attached test results and quality control data #14880.002 (lab reports at EPA regional files)	3/15/85	32	John W. Strand, Analytical Technologies	Applied Geotechnology
00000184.	Lab reports/raw data	Report of evaluation of the case 3467, Tacoma Tar Pits data. (Data at EPA regional files.)	3/25/85	15	Gerald Muth, EPA	
00000185.	Lab reports/raw data	Organics analysis data (data at EPA regional files)		320	EPA	
00000186.	Lab reports/raw data	Transmittal memo with attached map showing extent of coal tars	3/27/85	2	John G. Catts, Harding Lawson & Assoc.	Wayne Grotheer, EPA
00000187.	Lab reports/raw data	Tacoma Tar Pit sample identification with attachments. (Data at EPA regional files.) Case # 3759.	4/12/85	27		
00000188.	Lab reports/raw data	Letter with attachments re sample analysis. (Data at EPA regional file)	7/8/85	6	Sharon Hudson Bjork, Analytical Technologies, Inc.	Mark Adams, Applied Geotechnology

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00000189.	Lab reports/raw data	Letter with attachments re sample analyses. (Data at EPA regional files)	7/8/85	12	Sharon Hudson Bjork, Analytical Technologies, Inc.	Mark Adams, Applied Geotechnology
00000190.	Lab reports/raw data	Memo re quality assurance of Case 3467 (organics) with attached comments re laboratory performance. (Data at EPA regional file.)	7/8/85	21	Lynn Guilford, Andrew Hafferty, Ecology & Environment, Inc.	John Osborn, EPA
00000191.	Lab reports/raw data	Letter with attached sample results and quality control data. (Data at EPA regional file.)	7/10/85	12	Sharon Hudson Bjork, Analytical Technologies	Mark Adams, Applied Geotechnology
00000192.	Lab reports/raw data	Letter with attached sample results. (Data at EPA regional file.)	7/11/85	13	Sharon Hudson Bjork, Analytical Technologies	Mark Adams, Applied Geotechnology
00000193.	Lab reports/raw data	Memo re quality assurance of Case 3759 (VOAs and BNAs) with attached comments on data qualifications. (Data at EPA regional file.)	7/11/85	12	Roger McGinis, Andrew Hafferty, Ecology & Environments, Inc.	John Osborn, EPA
00000194.	Lab reports/raw data	Letter with attached sample analyses. (Data at EPA regional file)	7/15/85	14	Analytical Technologies	Mark Adams, Applied Geotechnology
00000195.	Lab reports/raw data	Letter with attached sample analyses. (Data at EPA regional file)	7/15/85	10	Sharon Hudson Bjork, Analytical Technologies, Inc.	Mark Adams, Applied Geotechnology
00000196.	Lab reports/raw data	Letter with attached sample analyses. (Data at EPA regional file.)	7/22/85	44	Analytical Technologies, Inc.	Mark Adams, Barbara Trijo, Applied Geotechnology
00000197.	Lab reports/raw data	Memo with attachments re quality assurance of case 3467 (inorganics and Anions). (Data at EPA regional file.)	8/2/85	7	Roger McGinis, Andrew Hafferty, Ecology & Environment, Inc.	John Osborn, EPA
00000198.	Lab reports/raw data	Memo re quality assurance of case 3759 (organics) with attachments re data qualifications	8/16/85	9	John Ryding, Andrew Hafferty, Ecology & Environments, Inc.	John Osborn, EPA
00000199.	Lab reports/raw data	Sample numbers, location, depth and date, with attachments re quality assurance of Case 3467 (inorganics)	8/13/85	15	Cathy Heinrich, John Osborn, EPA	Roger McGinnis, Andrew Hafferty, Ecology & Environment, Inc.

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00000200.	Lab reports/raw data	Memo re quality assurance of case 3630 (organics) with attached comments re data qualifications. (Data at EPA regional file.)	8/23/85	29	Lynn Guilford, Andrew Hafferty	EPA
00000201.	Lab reports/raw data	Memo re quality assurance of case 3630 (inorganics) with attached comments re data qualification. (Data at EPA regional file.)	8/23/85	7	Roger McGinnis, Andrew Hafferty, Ecology & Environment, Inc.	John Osborn, EPA
00000202.	Lab reports/raw data	Sample project analysis results #TEC-0770. Well at Hygrade Pre-chlorination tap. (Data at EPA regional file.)	9/18/85	64	EPA Lab	
00000203.	Lab reports/raw data	Letter with attached analytic data	9/24/85	12	Mark A. Adams, Applied Geotechnology	Wayne Grotheer, EPA
00000204.	Lab reports/raw data	Letter with attached sample analyses and quality control data. (Data at EPA regional file.)	10/21/85	8	Sharon Hudson Bjork, Analytical Technologies, Inc.	Applied Geotechnolo Inc.
00000205.	Lab reports/raw data	Letter with attached sample analyses and and quality control data. (Data at EPA regional file.)	11/1/85	4	Tlair K. Augsburger, Analytical Technologies, Inc.	Applied Geotechnolo Inc.
00000206.	Contract Management Documents	Work Assignment Form. Attached description of work	8/8/86	2	CH_2M Hill Prepared for EPA	
00000207.	Lab reports/raw data	Letter with attached sample analyses and quality control data. (Data at EPA regional file.)	11/11/85	16	Tlair K. Augsburger, Analytical Technologies, Inc.	Applied Geotechnolog Inc.
00000208.	Lab reports/raw data	Letter with attached sample analyses and quality control data. (Data at EPA regional file.)	11/13/85	9	Tlair K. Augsburger, Analytical Technologies, Inc.	Applied Geotechnolog Inc.
00000209.	Lab reports/raw data	Letter with attached preliminary calculation of particulate matter emissions.	11/13/85	8	Walter J. Russell, Air Quality Consulting Services	Wayne Grotheer, EPA
00000210.	Lab reports/raw data	Letter with attachments re sample analyses. (Data at EPA regional file.)	11/12/85	21	Analytical Technologies, Inc.	Applied Geotechnolog Inc.
00000211.	Lab reports/raw data	Letter with attached sample analyses and and quality control data. (Data at EPA regional file.)	11/14/85	8	Tlair K. Augsburger, Analytical Technologies, Inc.	Applied Geotechnology Inc.

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00000212.	Lab reports/raw data	Letter with attached sample analyses and quality control data. (Data at EPA Regional file.)	11/21/85	11	Tlair K. Augsburger, Analytical Technologies, Inc.	Applied Geotechnology, Inc.
00000213.	Lab reports/raw data	Letter with attachments re sample analyses. (Data at EPA regional file.)	11/21/85	21	Analytical Technologies	Applied Geotechnology
00000214.	Lab reports/raw data	Letter with attachments re sample analyses. (Data at EPA regional file.)	11/21/85	17	Analytical Technologies	Applied Geotechnology
00000215.	Lab reports/raw data	Letter with attached sample test results #14888.002. (Data at EPA regional file.)	1985	23	John W. Strand, Analytical Technologies	Applied Geotechnology
00000216.	Lab reports/raw data	Letter with attached quality control deliverables. (Data at EPA regional file.)	1/13/86	40	Michael Higgins, Mark King, Analytical Technologies	Mark Adams, Applied Geotechnology
00000217.	Lab reports/raw data	Letter with attached sample results and quality control data.	8/22/86	8	T. J. Hogen, Washington Natural Gas	Wayne Grotheer, EPA
00000218.	Lab reports/raw data	List of result qualifiers for non-numeric results with sample project analysis results	10/23/86	8	EPA	
00000219.	Lab reports/raw data	List of result qualifiers for non-numeric results with attached sample project analysis results. Sample No. 86434550-4.	12/21/86	7	EPA	
00000220.	Lab reports/raw data	Sample project analysis results. Sample No. 87060020-29.	3/31/87	10	EPA Lab	
00000221.	Lab reports/raw data	List of result qualifiers for non-numeric results with attached sample project analysis. Sample No. 87060020-29.	4/9/87	11	EPA Lab	
00000222.	Lab reports/raw data	Sediment sample test results.	No date	10	Unknown	
00000223.	Lab reports/raw data	Sediment sample test results.	No date	10	Unknown	
00000224.	Lab reports/raw data	Water sample test results	No date	10	Unknown	
00000225.	Lab reports/raw data	Water sample test results	No date	10	Unknown	
00000226.	Lab reports/raw data	Table regarding material categories	No date	1	Unknown	
00000227.	Lab reports/raw data	Field logs of boring	10/26/84	6	Harding, Lawson Associates	

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00000228.	Maps and photos	Tacoma Gas Company building locations. (Map located at EPA regional file)	9/10/23	1	Byflesby Engineering and Management Corp.	
00000229.	Maps and photos	Aerial photograph. (Map located at EPA regional file.)	1953	1	Unknown	
00000230.	Maps and photos	Station piping, Tacoma plot plan. (Map located at EPA regional file.)	6/20/56	1	Washington Natural Gas Co,	
00000231.	Maps and photos	Tacoma station piping regulations, headers. (Map located at EPA regional file.)	6/22/56	1	Washington Natural Gas Co.	
00000232.	Maps and photos	Tacoma station piping building and piping details. (Map located at EPA regional file.)	6/25/56	1	Washington Natural Gas Co.	
00000233.	Maps and photos	Tacoma station piping building and piping details. (Map located at EPA regional file.)	7/2/56	1	Washington Natural Gas Co.	
00000234.	Maps and photos	Building location drawing, Tacoma station. (Map located at EPA regional file.)	7/5/56	1	Washington Natural Gas Co.	
00000235.	Maps and photos	Tacoma station regulator buildings, plan and elevation. (Map located at EPA regional file.)	7/6/56	1	Washington Natural Gas Co.	
00000236.	Maps and photos	Tacoma station regulator buildings, details. (Map located at EPA regional file.)	7/9/56	1	Washington Natural Gas Co.	
00000237.	Maps and photos	Station piping, Tacoma station piping details. (Map located at EPA regional file.)	7/14/56	1	Washington Natural Gas Co.	
00000238.	Maps and photos	Tacoma station piping details. (Map located at EPA regional file.)	7/16/56	1	Washington Natural Gas Co.	
00000239.	Maps and photos	Station piping, Tacoma details. (Map located at EPA regional file.)	7/17/56	1	Washington Natural Gas Co.	

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00000240.	Maps and photos	Tacoma station valve and piping schematic. (Map located at EPA regional office.)	10/18/61	1	Washington Natural Gas Co.	
00000241.	Maps and photos	Plant station valve and piping schematic. (Map located at EPA regional office.)	10/18/61	1	Washington Natural Gas Co.	
00000242.	Maps and photos	Property of Washington Natural Gas Co. plant. (Map located at EPA regional file.)	3/24/64	1	Washington Natural Gas Co.	
00000243.	Maps and photos	Diagram showing plat boundary of old Tacoma Gas Company property. (Map located at EPA regional file.)	2/30/65	1	Washington Natural Gas Co.	
00000244.	Maps and photos	Property of Washington Natural Gas Co. plant. (Map located at EPA regional file.)	3/7/68	1	Washington Natural Gas Co.	
00000245.	Maps and photos	Map (located at EPA regional file)	No date	1	Plan Book, City of Tacoma	
00000246.	Maps and photos	Drawing (located at EPA regional file)	No date	1	Unknown	
00000247.	Maps and photos	Surface drainage and surface water sample locations	1/84	1	Harding, Lawson Assocs.	
00000248.	Maps and photos	Proposed well locations	1/84	1	Harding, Lawson Assocs.	
00000249.	Maps and photos	Map, SWk. Sec. 3 TWP20N. R E W.M. (Located at EPA regional file)	No date	1	Plan Book, City of Tacoma	
00000250.	Maps and photos	Diagram, spur track agreement.	No date	1	Unknown	
00000251.	Maps and photos	Diagram (located at EPA regional file)	No date		Unknown	
00000252.	Maps and photos	Diagram of investigation stations. (Located at EPA regional file.)	No date		Applied Geotechnology, Inc.	
00000253.	Maps and photos	Map, NEk. Sec 4 TWP 20 N. R.3E W.M. (Located at EPA regional file.)	No date		Plan Book, City of Tacoma	
00000254.	Maps and photos	Diagram (located at EPA regional file)	No date		Unknown	
00000255.	Maps and photos	Aerial photograph (located at EPA regional file)	No date		Unknown	

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00000256. Maps and photos	Aerial photo (located at EPA regional file)	No date		Unknown	
00000257. Maps and photos	Assessment of Commencement Bay, Tar Pits, site location and vicinity map	No date	1	Kennedy Jenks, Engineers	
00000258. Maps and photos	Site location map, location and vicinity map	No date	1	Harding Lawson Associates	
00000259. Maps and photos	Aerial photos (located at EPA Regional file)	No date	19	Unknown	
00000260. Maps and photos	Superfund sites map	No date	1	Unknown	
00000261. Correspondence, miscellaneous	Memoranda with attachments regarding problems with CLP data from the EAL Corp.	3/25/86	7	Joyce Crosson, EPA	Jim Everts, EPA
00000262. Correspondence, miscellaneous	Letter with attached copies of water resource permit and certificate of ground water right	8/9/83	4	Frank L. Kirk, Hygrade Food Products Corp.	Judi Schwarz, EPA
00000263. Correspondence, miscellaneous	Letter re recycling of tar by Burlington Northern	2/20/84	1	M. L. Cook, Burlington Northern Railroad	Phil Wong, EPA
00000264. Other documents and info.	Letter with attached list of Superfund sites and aerial photos	10/4/83	3	Judi Schwarz, EPA	Timothy J. Hogan, Washington Natural G
00000265. Other documents and info.	File review checklist for Hygrade Corp. and site data	4/6/83	3	Thomas A. Tobin	
00000266. Other documents and info.	Site data inspection report	2/4/87	5	WDOE, Mike Blum, Paul Ritchie	
00000268. Contract management documents	Technical status report re work assignment #095-0611.0 (CH2MHill)	10/13/86	2	S. J. Hahn, EPA	
00000269. Contract management documents	Technical status report re work assignment #095-0611.0 (CH2MHill)	11/12/86	2	S. J. Hahn, EPA	
00000270. Contract management documents	Technical status reprot re work assignment #095-0611.0 (CH2MHill)	12/15/86	2	J. Stoupa, EPA	
00000271. Contract management documents	Technical status report re work assignment #095-0611.0 (CH2MHill)	1/15/87	2	J. Stoupa, EPA	
00000272. Contract management documents	Technical status report re work assignment #095-0611.0 (CH2MHill)	2/12/87	2	J. Stoupa, EPA	

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00000273.	Contract management documents	Technical status report re work assignment #095-0611.0 (CH2MHill)	3/16/87	2	J. Stoupa, EPA	
00000274.	Contract management documents	Technical status report re work assignment #095-0611.0 (CH2MHill)	4/17/87	2	J. Stoupa, EPA	
00000275.	Contract management documents	Technical status report re work assignment #095-0611.0 (CH2MHill)	5/13/87	2	J. Stoupa, EPA	
00000276.	Contract management documents	Technical status report re work assignment #095-0611.0 (CH2MHill)	6/17/87	2	J. Stoupa, EPA	
00000277.	Contract management documents	Technical status report re work assignment #095-0611.0 (CH2MHill)	7/13/87	2	J. Stoupa, EPA	
00000278.	Contract management documents	EPA Summary Evaluation Report (SER) with attached description of activities and performance (CH2MHill)	3/16/87	3	Wayne Grotheer, EPA	
00000279.	Contract management documents	Award Fee Performance Event Report Parts 1 and 2 (CH2MHill)	7/13/87	2	Wayne Grotheer, EPA	
00000280.	Contract management documents	EPA Summary Evaluation Report (SER) (CH2MHill)	7/7/87	1	Wayne Grotheer, EPA	
00000281.	Contract management documents	Breakdown of Harding Lawson Associates' budget estimate	No date	1	Unknown	
00000282.	NPL listing and comments	Federal Register, Vol. 47, No. 251, NPL proposed rules and listing of sites	12/30/82		EPA	
00000283.	NPL listing and comments	Federal Register, Vol. 48, No. 175, NPL list	9/8/83		EPA	
00000284.	Maps and photos	Aerial photographs of Tacoma Tar Pits. Two containers, 26 slides each. (Slides located at EPA Regional file.)				
00000285.	Risk Assessment/Feasibility Study Folder 2	Letter re Review and Comments on "Risk Assessment of the Tacoma Historical Coal Gasification Site" Final Report dated July 1987	8/14/87	3	John Catts, Harding Lawson Associates	Wayne Grotheer,

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00000286.	Risk Assessment/Feasibility Study Folder 2	Letter re Review and Comments on Risk Assessment (Final) and Feasibility Study (draft); with attached memo from David Lincoln/SEA to Joan Stoupa/SEA re Review of Tacoma Coal Gassification Risk Assessment (8/14/87)	8/17/87	5	Joan Stoupa, CH_2M Hill	Wayne Grotheer, EPA
00000287.	Risk Assessment/Feasibility Study Folder 2	Letter re Review and Comments on "Feasibility Study of Tacoma Historical Coal Gasification Site," dated July 1987	8/17/87	5	John Catts, Harding Lawson Associates	Wayne Grotheer, EPA
00000288.	Risk Assessment/Feasibility Study Folder 2	Memo re Review of Risk Assessment (July 1987) and comments on previous drafts	8/21/87	4	Dana Davoli, Health & Environmental Assessment, EPA	Wayne Grotheer, EPA
00000289.	Risk Assessment/Feasibility Study Folder 2	Letter re Comments on draft Feasibility Study (July 1987)	8/25/87	5	Megan White, WDOE	Wayne Grotheer, EPA
00000290.	Risk Assessment/Feasibility Study Folder 2	Memo re comments and evaluation of technologies proposed in the feasibility study for permanent site remediation; attached article from Journal of Environmental Engineering, "Evaluating Asphalt Cap Effectiveness at Superfund Sites." (June, 1987)	9/1/87	7	John Barich, Bob Stamnes, ESD, EPA	Lee Marshall, EPA
00000291.	Risk Assessment/Feasibility Study Folder 2	Letter re Review and Comments by EPA and WDOE on draft Feasibility Study submitted August 3, 1987; attached partial copies of same letter to 1) Douglas Ehlke, 2) Charles Blumerfeld, Bogle & Gates, 3) Tim Hogan, Washington Natural Gas	9/14/87	13	Wayne Grotheer, EPA	Michael Cook, Burlington Northern Railroad
00000292.	Remedial Investigation Report, Folder 3, Final	Vol. 1 Remedial Investigation, Final Report, Tacoma Tar Pits, Tacoma, Washington.	9/87	251	Applied Geotechnology Inc., on behalf of Washington Natural Gas, Joseph Simon & Sons, Hygrade Food Products, Burlington Northern Railroad.	

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00000293.	Lab Reports/Raw Data	Data Package: Case #3467 located at EPA Manchester Lab.	Shipping Date: 11/06/84	--	Versar Lab	EPA Manchester L
00000294.	Lab Reports/Raw Data	Data Package: Case #3467 located at EPA Manchester Lab.	Shipping Date: 11/06/84	--	Rocky Mtn. Lab	EPA Manchester L
00000295.	Lab Reports/Raw Data	Data Package: Case #3467 located at EPA Manchester Lab.	Shipping Date: 11/07/84	--	Cambridge Lab	EPA Manchester L.
00000296.	Lab Reports/Raw Data	Data Packages: Case #3759 located at EPA Manchester Lab.	Shipping Date: 01/07/85 & 01/08/85	--	EAL	EPA Manchester L.
00000297.	Lab Reports/Raw Data	Data Package: Case #3579 located at EPA Manchester Lab.	Shipping Date: 01/08/85	--	Versar Lab	EPA Manchester La
00000298.	Lab Reports/Raw Data	Data Package: Case #3630 located at EPA Manchester Lab.	Shipping Date: 12/07/84	--	Wilson Lab	EPA Manchester La
00000299.	Lab Reports/Raw Data	Data Package: Case #3759 for sample Nos. MJ0969 through MJ0980 located at EPA Manchester Lab.	Sampling Date: 1/14/85 - 1/16/85	--	Harding Lawson Associates, Ecology & Environment	EPA Manchester La
00000300.	Lab Reports/Raw Data	Data Package: Case #3467 for sample Nos. MF0901 through MJ0908 located at EPA Manchester Lab.	Sampling Date: 10/26/84	--	Harding Lawson Associates, Ecology & Environment	EPA Manchester La
00000301.	Lab Reports/Raw Data	Summation forms re parameter hazards for sample numbers 87060020 through 87060029	87	10	EPA Manchester Lab	
00000302.	Lab Reports/Raw Data	Summation form for parameter hazards for sample No. 85220650.	85	1	EPA Manchester Lab	
00000303.	Lab Reports/Raw Data	Summation forms for parameter hazards for sample Nos. 86434550 through 86434554	86	5	EPA Manchester Lab	

Doc#	File	Type/Description	Date	# Pages	Author/Organization	Addressee/Organization
00000304.	Lab Reports/Raw Data	Sample analysis results for sample Nos. 85220650 through 85220663.	5/29/85	21	EPA Lab Region X	
00000305	Lab Reports/Raw Data	Sample analysis results for sample Nos. 85230450 through 85230455.	6/3/85	9	EPA Lab Region X	
00000306.	Lab Reports/Raw Data	Sample analysis results for sample Nos. 86434550 through 86434554.	10/23/86	5	EPA Lab Region X	
00000307.	Lab Reports/Raw Data	Sample analysis results for sample Nos. 87060020 through 87060029.	2/4/87	10	EPA Lab Region X	
00000308	Community Relations and news releases	EPA fact sheet: Superfund Project Update	11/10/87	5	EPA	
00000309	Remedial Investigation Reports Folder 3, Final	Addendum to Remedial Investigation (RI) Report	No date	4	EPA	Record
00000310	Risk Assessment/feasibility study, Folder 2	Addendum to Risk Assessment	No date	4	EPA	Record
00000311	Risk Assessment/feasibility study, Folder 2	Addendum to The Feasibility Study	No date	2	EPA	Record
00000312	Risk Assessment/feasibility study, Folder 2	Feasibility Study, Final Report	7/87	422	Envirosphere Company	Washington Natural Gas Company, Joseph Simon a Sons, Inc., Hygrade Foo Products Corp., Burlingt Northern Railroad Compar
00000313	Risk Assessment/feasibility study, Folder 2	Cover letter re: attached response to comments on the Feasibility Study	10/22/87	42	Spyros P. Pavlou, Envirosphere Company	Wayne Grotheer, EPA
00000314	Proposed Plan for Remedial Action	Proposed Plan for Remedial Action	11/4/87	17	EPA	
00000315	Proposed Plan for Remedial Action	Memo re: Proposed Remedial Action	11/13/87	1	Joel Hulder, ATSDR, EPA/ CDC Liaison	Lee Marshall, EPA

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c#	File	Type/Description	Date	# Pages	Author/Organization	Addressee/Organization
000316	Proposed Plan for Remedial Action	Presentation for Proposed Plan for Remedial Action: Public hearing transcript.	11/18/87	19	Lee Marshall, EPA Timothy Brincefield, EPA	
000317	Proposed Plan for Remedial Action	Letter re: Public hearing on proposed plan.	11/13/87	1	Timothy J. Hogan, Washington Natural Gas	Lee Marshall, EPA
000318	Proposed Plan for Remedial Action	Memo re: ATSDR review of Proposed Plan.	11/13/87	1	Joel Mulder, ATSDR, EPA/ CDC Liaison	Lee Marshall, EPA
000319	Proposed Plan for Remedial Action	Memo re: Comments on Proposed Plan	11/30/87	2	Chief, Health Sciences Branch Office of Health Assessment, ATSDR	Joel Mulder, ATSDR, EPA/CDC Liaison
000320	Proposed Plan for Remedial Action	Letter re attached letter concerning NPL listing and state requirements for selection of remedy	12/04/87	2	Lee Marshall, EPA	Timothy J. Hogan, Washington Natural Gas
000321	Proposed Plan for Remedial Action	Letter re notice letters to property owners and utilities, and attached comments on Proposed Plan	12/4/87	3	Charles R. Blumenfeld, Bogle & Gates	Lee Marshall, EPA
00322	Notice letters and Responses	Memo re: notice to responsible parties with attached list of potentially responsible party attendance at 7/82 meeting.	3/20/82	2	John R. Spencer, EPA	William A. Sullivan, Jr., EPA
00323	Notice letters and Responses	Letter re: response to notification of potential responsibility.	5/4/82	1	T. J. Hogan, Washington Natural Gas	Ms. Kathy L. Summerlee, U.S. EPA, Washington, D.C
00324	Notice letters and Responses	Letter of notification re potential responsibility and request for attendance at meeting.	7/20/82	2	Robert A. Poss, EPA	Timothy J. Hogan, Washing Natural Gas
00325	Notice Letters and Responses	Letter of notification re potential responsibility and request for attendance at meeting.	7/20/82	2	Robert A. Poss, EPA	Phillip Simon, Joseph Sim & Sons
00326	Notice letters and Responses	Letter of notification re potential responsibility and request for attendance at meeting.	7/20/82	2	James M. Everts for Robert A. Poss, EPA	Frank Kirk, Hygrade Food Products Corp.

Doc #	File	Type/Description	Date	# Pages	Author/Organization	Addressee/Organization
000327	Notice Letters and Responses	Letter re: request to undertake site investigation.	7/30/82	2	Robert A. Poss, EPA	Timothy Hogan, Washington Natural Gas
000328	Notice Letters and Responses	Letter re: request to undertake site investigation.	7/30/82	2	Robert A. Poss, EPA	Frank Kirk, Hygrade Food Products Corp.
000329	Notice Letters and Responses	Letter re: request to undertake site investigation.	7/30/82	2	Robert A. Poss, EPA	Phillip Simon, Joseph Simon & Sons
000330	Notice Letters and Responses	Letter of notification re: potential responsibility.	8/10/82	3	John R. Spencer, EPA	Earl Curry, Burlington Northern Railroad
000331	Notice Letters and Responses	Letter of notification re potential responsibility and request for attendance at meeting.	8/13/82	3	Robert A. Poss, EPA	Earl Curry, Burlington Northern Railroad
000332	Notice Letters and Responses	Letter of notification re potential responsibility.	8/13/82	2	John R. Spenser, EPA	Jeff S. Asay, Union Pacific Railroad Company
000333	Notice Letters and Responses	Letter of notification re potential responsibility and request for attendance at meeting.	8/13/82	2	Robert A. Poss, EPA	Jeff S. Asay, Union Pacific Railroad Company
000334	Notice Letters and Responses	Letter re: request to undertake site investigation.	8/24/82	2	Robert A. Poss, EPA	Jeff S. Asay, Union Pacific Railroad Company
000335	Notice Letters and Responses	Letter re: request to undertake site investigation.	8/24/82	2	Robert A. Poss, EPA	Michael L. Cook, Burlington Northern Railr
000336	Notice Letters and Responses	Letter requesting information with attached list of historical information.	10/19/82	3	Robert A. Poss, EPA	Robert R. Gulliver, Washington Natural Gas
000337	Notice Letters and Responses	Letter of response to request for information.	11/5/82	2	T. J. Hogan, Washington Natural Gas	Robert A. Poss, EPA
000338	Notice Letters and Responses	Letter re previous notification of potential responsibility and EPA review of study by Kennedy/Jenks Engineers	11/08/83	2	Robert A. Poss, EPA	Robert R. Gulliver, Washi Natural Gas

Doc#	File	Type/Description	Date	# Pages	Author/Organization	Addressee/Organization
00000339	Notice Letters and Responses	Letter re previous notification of potential responsibility and EPA review of study by Kennedy/Jenks Engineers.	11/08/83	2	Robert A. Poss, EPA	Jeff S. Asay, Union Pacific Railroad
00000340	Notice Letters and Responses	Letter re previous notification of potential responsibility and EPA review of study by Kennedy/Jenks Engineers.	11/08/83	2	Robert A. Poss, EPA	Frank L. Kirk, Hygrade Food Products Corp.
00000341	Notice Letters and Responses	Letter re previous notification of potential responsibility and EPA review of study by Kennedy/Jenks Engineers.	11/08/83	2	Robert A. Poss, EPA	Phillip Simon, Joseph Simon & Sons, Inc.
00000342	Notice Letters and Responses	Letter re previous notification of potential responsibility and EPA, review of study by Kennedy/Jenks Engineers.	11/08/83	2	Robert A. Poss, EPA	Mike Cook, Burlington Northern Railroad
0000343	Remedial Investigation Reports, Folder 3, Final	Volume 2, Remedial Investigation Final Report.	9/87	280	Geotechnology, Inc.	Prepared for Washington Natural Gas Corp., Joseph Simon & Sons, Inc., Hygrade Food Products Corp., Burlington Northern Railroad Company.

DOCUMENTS DELETED FROM TAR PITS ADMINISTRATIVE RECORD

DOC. #	FILE	SUBJECT/TITLE	REASON REMOVED
00000006.	Pre-Superfund information	Request for authorization to retire	Duplicate of Doc. #2
00000123.	Contract management doc.	Contract Pricing proposal, 9/5/86, 4 pp., Sellman, CH2MHill/Moore, EPA	Confidential business information
00000124.	Contract management doc.	Technical status report 6/17/87, 42 pp., CH2MHill/Catte, Harding Lawson Assocs.	Several TSR included under Doc. #000000194. They wre separated and given individual document numbers (see Doc. #00000268-00000277).
00000160.	Contract management doc.	Technical status report 7/13/87, 5 pp., CH2MHill/Catte, Harding Lawson Assocs.	Same reason for removal as for Doc. #000000194 above.
00000125.	Contract management doc.	Exhibit I: Breakdown of HLA's budget estimate, 5 pp., Harding Lawson Assocs.	Confidential business information

APPENDIX II

RESPONSIVENESS SUMMARY

TACOMA TAR PITS

TACOMA, WASHINGTON

This community relations responsiveness summary is divided into the following sections:

Section A — Overview. This section discusses the EPA selected alternative for corrective action, and public reaction to this alternative.

Section B — Background on Community Involvement and Concerns. This section provides a brief history of community interest and concerns raised during remedial planning activities at the Tacoma Tar Pits.

Section C — Summary of Comments Received During the Public Comment Period and EPA's Responses to the Comments. Both written and oral comments are categorized. EPA's responses to these comments are also provided.

Section D — Remaining Concerns. This section describes remaining communi concerns that EPA should take into consideration in conducting the remedial design and remedial action at the Tacoma Tar Pits site.

A. OVERVIEW

A group of Potentially Responsible Parties (PRPs) including Washington Natural Gas Company, Joseph Simon and Sons, Inc., Hygrade Food Products, Inc. and Burlington Northern Railroad Company, with oversight by the EPA and Ecology performed the RI/FS at the Tacoma Tar Pits site in Tacoma, Washington.

In 1924, a coal gasification plant was built on the site. This plant operated until 1956 during which time, waste materials from the coal gasification process were disposed of on-site. Demolition of the plant began in 1965 and was comoleted by 1966. During the dismantling and demolition procedure, some waste materials and process equipment were left in place. In 1967, the property was purchased and metal recycling operations were initiated. This operation introduced a variety of organic and heavy metal contaminants to soils on site.

The selected remedial alternative resulted from modification, primarily in the areas of quantity of material to be stabilized and site boundary definition, of the remedial alternative recommended by the above named PRPs. These modifications were required by EPA and Ecology. This modified remedial action includes excavation and stabilization of contaminated soils and capping of the stabilized soil matrix. This alternative is described in more detail in the Decision Summary and the Feasibility Study.

This Responsiveness Summary describes concerns which the community has expressed in regards to problems at the site and the recommended cleanup alternative. Very few public comments were made at the public hearing on November 18, 1987, and one comment was received from the PRPs during the public meeting. The Puyallup Indian tribe provided written comments following the close of the public comment period. Because their comments were of

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B. BACKGROUND ON COMMUNITY INVOLVEMENT

There has not been much specific community interest in the Tacoma Ta Pits site, except for the directly affected businesses. Most community involvement has focused on the greater Commencement Bay site, of which this is a part. The directly affected businesses agreed to conduct the remedial investigation and feasibility study in 1984.

The news media covered EPA's 1984 remedial investigation start and subsequent responsible party takeover of the investigation.

The Commencement Bay Citizens Advisory Committee has discussed the site several times with the site manager. The most recent discussion was on September 10, 1987, when the Agency presented the draft RI and FS results. The focus of their concerns have been cleanup levels on and off the site, the basis for those levels, and who would pay the cost of cleanup.

1) Citizens have requested to know the proposed cleanup levels on and off the site and the basis for those levels.

EPA Response: The specific levels proposed were explained in detail, and are explained elsewhere in this document. The levels are based on applicable, relevant and appropriate requirements in federal and state law.

2) Citizens have requested to know who would pay the cost of cleanup.

EPA Response: Responsible parties are conducting the RI/FS. The agency will seek to have them pay for cleanup as well as for EPA's own costs.

2. A concern was raised with regard to the effectiveness of the stabilization process for immobilizing contaminants.

Agency Response - Although the cement/polymer stabilization process is a proven technique for immobilization of heavy metals, this technique has not been conclusively proven to be effective in immobilizing organic contaminants in coal tars. Therefore, both laboratory and bench scale treatability studies will be performed during the design phase of the remedial action to ensure the process will be effective and permanent.

During laboratory scale studies, the proper mixture of components and additives will be determined such that maximum contaminant immobilization is achieved. During bench scale studies, the leachability of the stabilized matrix will be evaluated following adequate curing and aging.

As an option to stabilization of all contaminated soils, the soils/tars containing the highest tar content (EHW) may be considered for an alternate type of treatment/disposal (i.e., incineration) if the stabilization process is found to be ineffective for the waste matrix. The volume of this EHW would be relatively small and this would significantly reduce the average organic carbon content of the soil to be stabilized.

3. A question was raised regarding the property to the east of East River Street, and whether contaminants existed beneath this property.

Agency Response - Historical information suggests that tars were not directly placed in this location. However, overland flow of wastes or wastewaters from the coal gasification plant did occur in this location. When groundwater monitoring well AGI-1D was constructed, visible evidence of tar-related materials was observed. Therefore, some degree of soil contamination is present east of East River Steet.

Written Comments from the PRPs

4. The record should reflect that additional potentially responsible parties beyond the undersigned have been identified for the Tacoma Tar Pit site. These additional potentially responsible parties should be promptly notified of their potential liability associated with the site pursuant to Section 122 of CERCLA so that they may have a meaningful opportunity to participate in decisions regarding the remediation of the site.

Agency Response - EPA and Ecology agree that to the extent additional responsible parties are identified, such parties should be notified consistent with the requirements of SARA. The EPA will perform this activity in a timely fashion.

5. Several attempts have been made to clarify the extent of material that will be excavated and treated under the proposed remediation plan. Your letter of December 1, 1987, states that PAH contaminated material containing in excess of 1 percent PAH must be excavated and treated in order to satisfy the "State requirement that all extremely hazardous wastes are removed from the site or treated...". The PAH contaminated materials have remained undisturbed at the site for over 30 years. There is no applicable state requirement nor is there any relevant and appropriate requirement under the State's Waste Management laws or the regulations thereunder that mandates removal and treatment of all extremely hazardous material at the site. These points are further clarified under the State's newly enacted laws dealing with Hazardous Waste Sites--Cleanup Operations, Senate Bill No. 6805. Section 29 of the new law amends the Hazardous Waste Management laws, chapter RCW 70.105, with the addition of the following language:

A person conducting a remedial action pursuant to an approved settlement agreement or the department conducting a remedial action or the department conducting a remedial action under Chapter 70. RCW (Section 1 though 25 of this act) is exempt from the procedural and substantive requirements of this chapter. (emphasis added).

If this severely contaminated material is left in place, the total quantity of contaminants left in contact with local groundwater would be significantly increased and the effectiveness of the site cleanup may be significantly decreased. The statutory mandate in CERCLA, as amended by SARA, for treatment of contaminants to the maximum extent practicable is also met by the stabilization of all EHW found at the site during remediation.

All EHW materials should be treated in a similar fashion. Materials classified as EHWs left beneath the site in areas other than the pit, ponds, and tar boil area would interact with the environment in a fasnion similar to EHW's at these three locations if these locations were merely capped. This is considered unacceptable and all on-site EHW should be dealt with in a consistent fashion.

6. Written comments from the Puyallup Indian Tribe received after the close of the public comment period.

On December 17, 1987 EPA received a letter from Thomas Deming for the Puyallup Tribe of Indians dated 5 December 1987. The letter was postmarked December 16, 1987. It should be noted that the public comment period closed December 6, 1987. Although the letter was received after the close of the comment period, EPA had not completed the final drafting of the responsiveness summary. Therefore, without regard for formal determination of the acceptability of the letter (given its timing), EPA will respond to the specific issues raised by Mr. Deming for the Puyallup Tribes.

Comment - Tacoma Tar Pits site is within the boundaries of the Puyallup Reservation and, therefore, the remedial action chosen must include special consideration in protecting the environment and natural resources which are integral components of tribal life.

C. SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND AGENCY RESPONSES TO THE COMMENTS

Comments from members of the public, primarily several PRPs, regarding the selected remedial alternative are summarized below. Comments are grouped into those generated during the public meeting and those received in writing during the formal public comment period.

The public comment period ran from November 6, 1987, to December 6, 1987, (30 days). A public meeting was held at Pierce County Health Department on Wednesday evening November 18, 1987, to explain the results of the site investigations and to discuss the recommended remedial alternatives.

Comments Made During the Public Meeting

1. A concern was raised regarding the extent of contamination of local groundwater and why no action was to be taken to clean up this resource.

Agency Response - The RI results show that the two upper zones of groundwater (aquifers) contain waters that are contaminated. The third aquifer appears to be free of contamination. The shallow ground water is not currently used as a potable resource, nor is it expected to be used as a resource in the future due to salinity, low yield and the characteristically high dissolved solids. Local groundwater supply wells are completed at depths much greater than the vertical extent of contamination. Therefore, groundwater extraction and treatment is not included within the selected alternative. However, if monitoring suggests that contaminants are being discharged off-site at concentrations exceeding performance standards, a hydrogeologic investigation of design study for groundwater extraction and treatment will be initiated.

Agency Response - A review of BIA map dated 1977 indicates that the site is not located within the reservation boundary set forth and recognized at that time. Although the question of lands claimed or under legal dispute cannot be answered by this ROD action, EPA is required by SARA to consider environmental impacts and natural resources (and has in this instance) when selecting remedial action, whether the site is located on reservation property or not.

Comment - alternative #13 is not consistent with the federal trust responsibilities and thus must be reevaluated to assure complete cleanup. Also, the remedial alternative fails to adequately remedy groundwater problems.

Agency Response - Without addressing the legal issues of federal trust responsibilities and whether they apply at this site, it should be emphasized again that EPA has selected a remedy that is protective of public and environmental health. The remedy selected meets the standards, criteria, and other requirements of SARA and the NCP, including technical feasibility, institutional considerations, and cost-effective cleanup. As indicated above, water quality considerations will be protected by the remediation in conjunction with the enhanced groundwater monitoring. Measures for additional remediation will be considered on an as needed basis.

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We attempted to resolve this issue by agreeing to modify Alternative 13 to include treatment of all tar and sludge beneath the ponds and the pit which exceeded 1 percent PAH. This practical solution was offered not because of our recognition of the need to remove or treat extremely hazardous waste, but rather as a recognition that the structural integrity of the stabilized material may require treatment of unstable tar and sludge in any event.

EPA's proposed plan should be clarified by deleting any reference to excavation and treatment of extremely hazardous waste and, instead, refer to the excavation and treatment of the tar and sludge beneath the ponds and the pit which exceed 1 percent PAH concentration. The clarification does not in any way detract from the level of protection afforded human health and the environment by the selected alternative yet it provides a higher level of certainty that the quantities of material and estimated cost described in Alternative 13 are accurate.

Agency Response - It is the EPA's and Ecology's opinion that all material classified as EHW (>1 percent PAH) should be removed from the site regardless of location. This material should be excavated in the vicinity of the tar pit, ponds, and tar boil until levels less than 1 percent PAH are reached. Historical data suggests that a tar layer may be present under portion of the site other than these areas. In most areas, this tar may be present at depths of less than 3 feet, in which case, it would be excavated under the "shallow soil" criteria. If, however, tar material exceeding 1 percent PAH is found to be present at depths of greater than 3 feet, this material should be removed and treated in addition to the shallow soils.

APPENDIX III

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The Superfund Amendments and Reauthorization Act of 1986 (SARA) includes provisions for the selection and preference of remedial actions. Excavation and off-site land disposal options are least favored when on-site treatment options are available. Emphasis is placed on alternatives which permanently treat or immobilize contamination.

Requirements for cleanup of waste sites are identified in terms of Applicable or Relevant and Appropriate Requirements (ARARs). Applicable requirements are those standards or requirements which specifically address a hazardous substance, pollutant, or contaminant, remedial action, location, or other circumstance at a CERCLA site. For example, discharges of water to the navigable waterway are regulated under the National Pollution Discharge Elimination System (NPDES) program of the Clean Water Act. Relevant and Appropriate requirements are those that apply because conditions at the site sufficiently resemble conditions for which the requirements were developed. The Federal Resource Conservation and Recovery Act (RCRA) is an example of a law that is "relevant and appropriate" to the Tacoma Tar Pits site. This law is not applicable because the site was never given interim status nor issued a permit for handling solid waste. Nevertheless, the site sufficiently resembles a landfill as defined in 40 CFR 260 that waste handling standards may apply. While SARA requires that all ARARs be met, or in limited circumstances waived, the procedural requirements of such laws are waived for actions conducted entirely on site. Thus permits are not required.

State standards must be attained during remedial action under SARA if such standards were promulgated under state law that is more stringent than federal requirements, were identified to EPA in a timely manner, and are legally applicable or relevant and appropriate to the contaminants of concern. Most importantly, SARA requires that cleanup of a site ensure that the public health and environment are protected. It also requires that alternative remedies must be weighed in the selection process.

ARARs which may apply to this site are listed in the Feasibility Study and are presented here again with situations to which they may pertain. The specific provisions of ARARs that may be pertinent to a particular alternative are discussed when the alternatives are evaluated.

Federal Laws and Regulations

Resource Conservation and Recovery Act (RCRA)(42 USC 6901), Subtitle C:

- Part B permit. The use of certain treatment systems, in particular waste incinerators, requires the preparation of a Part B permit application. Information on the site such as geotechnical and hydrological conditions must be included along with intended uses of the site.

- Groundwater Protection (40 CFR 264, Subpart F). Pertains to groundwater monitoring, hazardous constituents, concentration limits, points of compliance, and corrective action. A program of groundwater monitoring must be implemented to detect the presence of contaminants at the point of compliance, which is usually at site boundaries. If concentrations of particular compounds are detected above designated limits more extensive monitoring is necessary and corrective actions may be required.

- Closure and Post-Closure (40 CFR 264, subpart G). Post-closure care must be provided for at least thirty years and includes monitoring, reporting, and maintenance of waste containment systems. Covers and similar structures must not be disturbed unless special conditions arise. A local land use authority must be notified of the presence of remaining contamination and the locations of waste facilities. Also, the previous use of the site and restrictions on the future use of the site must be recorded in the property deed.

D. REMAINING CONCERNS

Several issues concerning design parameters have been discussed but have not yet been totally resolved. These will be addressed in the subsequent design phase of this project and include:

Treatability of relatively pure coal tars by the stabilization process or alternative treatment/disposal methods

Criteria to be used to evaluate the effectiveness of the stabilization process during laboratory and bench scale studies

The number of additional monitoring wells needed to establish a groundwater monitoring network in lieu of groundwater extraction and treatment.

Criteria for determining the necessity for groundwater extraction and treatment be evaluated.

Performance of remediation to minimize possible disruptions to on-site operations.

Designation of Dangerous Waste (DW) and Extremely Hazardous Waste (EHW)(WAC 17-303-081 to 103):

- The state definition of a hazardous waste incorporates EPA designation of hazardous waste which is based on the compound being specifically listed as such, or on the waste exhibiting the properties of reactivity, ignitability, corrosivity, or Extraction Procedure (EP) toxicity. Ecology distinguishes hazardous waste as Extremely Hazardous Waste (EHW) or Dangerous Waste (DW). The distinction is based on the properties of persistence, concentration, carcinogenicity, mutagenicity, teratogenicity, concentration of certain compounds, and toxicity. Residues, contaminated soils, water, or other debris from the cleanup of spills of compounds listed on the "moderately dangerous chemical products list" (WAC 173-303-9903) in excess of 400 pounds are designated as DW. If the spilled compounds are listed on the "acutely dangerous chemical products list" (WAC 173-303-9903), soils, residues, water, or other debris in excess of 220 pounds are considered EHW. Materials containing greater than 1 percent PAH are considered EHW when the total quantity exceeds 220 pounds. However, wastes which were not designated as hazardous waste at the time of disposal are not considered DW or EHW. EPA and Ecology have determined that the EHW requirements are relevant and appropriate for the Tacoma Tar Pits site.

Incinerators (WAC 173-303-670):

- In addition to Federal regulations, incinerators must comply with the emission standards determined by the air pollution control authority, in this case, the Puget Sound Air Pollution Control Authority.

Groundwater Protection (WAC 173-303-645):

- Groundwater protection requirements for waste management facilities are generally comparable to Federal regulations. The point of compliance, the determination of dangerous constituents which are monitored, and the compliance concentrations, however, are determined by Ecology on a case-by-case basis.

Water Quality Standards (WAC 173-201):

- Surface water bodies are classified according to the water quality and uses of the water. The surface waters near the site are classified as follows:

  Class B (good) - Puyallup River, Inner Commencement Bay

  Class C (fair) - Commencement Bay - City Waterway

- Criteria are established for fecal coliform bacteria, dissolved oxygen, total dissolved gas, temperature, pH, and turbidity. In addition, concentrations of contaminants must be below levels which may adversely affect human health, the environment, or uses of the water body.

- The criteria and classifications of the State Water Quality Standards do not apply within a dilution zone defined by Ecology. Within the dilution zone, fish and shellfish must not be killed or aesthetic values diminished.

NPDES Permits (administered by the state under WAC 173-216):

- Discharges of water to off-site navigable waterways may require an NPDES permit. The concentration limits of contaminant discharges are determined on a case-by-case basis.

Water Pollution Control and Discharge Standards (90.48, 90.52, and 90.54 RCW):

- Waters of the state of Washington, which include surface water and groundwater, are to be protected to maximize their beneficial use. Materials and substances which might enter these waters must receive prior treatment with known, available, and reasonable methods.

Protection of Upper Aquifer Zones (WAC 173-154):

- Upper Aquifers and Upper Aquifer zones must be protected to the extent practicable to avoid depletions, excessive water level declines, or reductions in water quality in order to preserve the water for domestic, stockwater, and similar uses, and preserve spring and stream flow.

State Water Code (90.03 RCW) and Water Rights (90.14 RCW):

- These laws specify the conditions and extracting surface water or groundwater for nondomestic uses. Basically, water extraction must be consistent with beneficial uses of the resources and must not be wasteful. Groundwater extraction wells, which may be used to control the migration of contamination via groundwater, must comply with the substantive requirements necessary to obtain a water rights permit. Water rights laws may pertain if groundwater is extracted for treatment.

Water Well Construction (13.104 RCW and WAC 173-360):

- Minimum standards exist for water well construction, construction reports, and examination and licensing contractors and operators. These standards may apply if extraction wells are installed.

Submissions of Plans and Reports (WAC 173-240):

- Ecology must review plans for wastewater treatment facilities.

- Landfills (40 CFR 264, Subpart N). Provisions pertaining to the capping, monitoring, closure, and post-closure care of the site. A final cover must be placed which minimizes the migration of liqu through the landfill, requires minimal maintenance, promotes drainage, and minimizes degradation of the surface, accommodates, settling and subsidence without the loss of effectiveness, and has a permeability less than the underlying materials. The cap must be inspected and maintained, and groundwater monitoring conducted.

- Incinerators (40 CFR 264, Subpart O)(RCRA, Subtitle C, Section 3003). Provisions pertaining to the testing, performance standards, operation, monitoring, and closure of incinerators, including mobile incinerators. Wastes to be burned must be chemically analyzed; trial burns must be performed; the incinerator must be operated to achieve a destruction and removal efficiency (DRE) of 99.99 percent for Principal Organic Hazardous Constituents (POHCs); air emissions must be monitored, hydrogen chloride must be controlled to the less stringent of 99 percent removal or 1.8 kg per hour, and particulate emissions must not exceed 180 mg per dry standard cubic meter, and upon closure all wastes and waste residues must be removed. A Part B permit application must be submitted and approved prior to the use of an incinerator, except for test burns.

Clean Water Act (CWA)(33 USC 1251):

- National Pollution Discharge Elimination System (NPDES)(40CFR 122). These regulations govern point source discharges into navigable waterways such as the Puyallup River. Limits on the concentrations of contaminants which may be discharged are determined on a case-by-case basis.

Federal Water Quality Criteria:

- Water quality criteria are established which are limits on the concentration of compounds of fresh and marine waters. These criteria may apply to discharges into off-site surface water. The action levels include water quality criteria for on-site and boundary surface waters.

Safe Drinking Water Act (SDWA)(42 USC 300):

- Drinking Water Standards (40 CFR 141). Maximum contaminant levels (MCLs) must be attained for sources of drinking water. The MCL for lead (50 ppm) was included in the action levels. Drinking water regulations are relevant and appropriate to the lower aquifers at the site.

Department of Transportation, Parts 171 to 173:

- Transport, packaging, labeling, placarding, and manifesting of hazardous waste shipments. These regulations apply to the off-site shipment of contaminated soils and perhaps spent activated carbon. Waste materials must be identified, loaded in non-leaking containers, labeled and placarded as appropriate for the contents, and manifested to verify that the shipments reaches its intended destination.

Air Quality, General Emission Standards (WAC 173-400-040(5)):

- Contaminant air emissions from any sources must not be detrimental to the health, safety, or welfare of any person and must not damage any property or business. Emissions from incinerators must satisfy this requirement.

Air Emissions, New Source Review (WAC 173-400 and 173-403):

- Emissions of toxic air contaminants from new sources undergo a review process in which the contaminants are identified, the best available control technology (BACT) is determined, estimates are made of the maximum ambient air concentration (MAAC), and an acceptable ambient level (AAL) established. Based on these findings, a new source may be approved or disapproved. New source review applies to hazardous waste incinerators.

Incinerators (WAC 173-303-670):

- The state regulations regarding incinerators are comparable to Federal Regulations. In addition, regulations of the local air pollution control authority pertain. In the Tacoma area, the Puget Sound Air Pollution Control Authority (PSAPCA) has jurisdiction. According to PSAPCA regulations, particulate emissions are limited to 0.01 grains per standard dry cubic feet of air (gr/sdcf) compared to 0.08 required under federal regulations. Also, BACT must be used. Because Tacoma is a containment area for particulate matter, emissions must be less than 50 pounds per hour. Exceedence of this level requires the "purchase" of emission offsets at 1.1 times the emission rate.

Toxic Substances Control Act (TSCA)(15 USC 2601)x :

- Records, reporting, storage, handling, incineration, and landfill of PCB-containing wastes. (40 CFR 761.60-.79). These regulations apply to disposal or incineration of excavated PCB-contaminated materials. PCB materials which are disposed of prior to February 17, 1978, are considered to be in service and do not require excavation for disposal. Incineration of excavated PCB-containing materials must destroy 99.9999 percent of the PCBs. The incinerator must be approved and be operated under specific conditions. Materials containing less than 50 ppm PCBs may be disposed in a sanitary landfill.

Excavated materials containing PCBs at concentrations of 50 pm or greater when disposed must be placed in a chemical waste landfill. Several conditions must be met by a chemical waste landfill approved for PCB disposal: The landfill must be located in impermeable formations; synthetic liners may be required if the permeability of the underlying soil is judged to be excessive; the landfill must be located above historic groundwater levels and away from floodplains, shorelands, and groundwater recharge areas; flood protection must be provided; it must be located in areas of low to high relief to minimize erosion; surface waters and groundwater must be monitored at least for PCBs chlorinated organics, specific conductance, and pH; a leachate collection and monitoring system must be installed; the landfill must be operated with proper record-keeping and handling, and incompatible or ignitable wastes are not allowed; fences must be placed around the site, site roads must be maintained, and hazardous conditions due to spilled or windblown materials must be prevented.

State Regulations:

The state of Washington can develop its own hazardous waste regulations, provided they are at least as stringent as Federal regulations. For the most part, state hazardous waste regulations parallel the federal regulations. Therefore, the comparable state regulations are not repeated. There are some notable differences, however, which are discussed below.